AUTOMOTIVE INDUSTRIES

AI

AUTOMOTIVE and AVIATION MANUFACTURING

Civilian and Defense

AUGUST 15, 1951

In This Issue . . .

Light Alloys in the Le Sabre

Automatic Transmission Highlights

Vauxhall Tooling Up for New Car

Building a Bus per Hour at ACF-Brill

Advanced Machining of Jet Engine Parts

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A CHILTON PUBLICATION

Your production may change,

but you can still depend on HEALD PRECISION for

EXACT DUPLICATION of SIZE and FINISH

Tractors or tanks — they're all the same to a Heald Bore-Matic. But when you switch to defense production, the *proved dependability* of Heald precision is more important than ever before.

It means that you can be *sure* of maintaining exact duplication of size and finish — not only on those critical initial orders, but on the full-scale production that will follow. It means the utmost in working *efficiency*, too — with faster, easier and better production of precision finished parts.

Remember — when it comes to precision finishing, it pays to come to Heald.

THE HEALD MACHINE COMPANY
WORCESTER 6, MASSACHUSETTS

Branch Offices: Chicago • Cleveland • Dayton • Detroit
Indianapolis • New York

HEALD

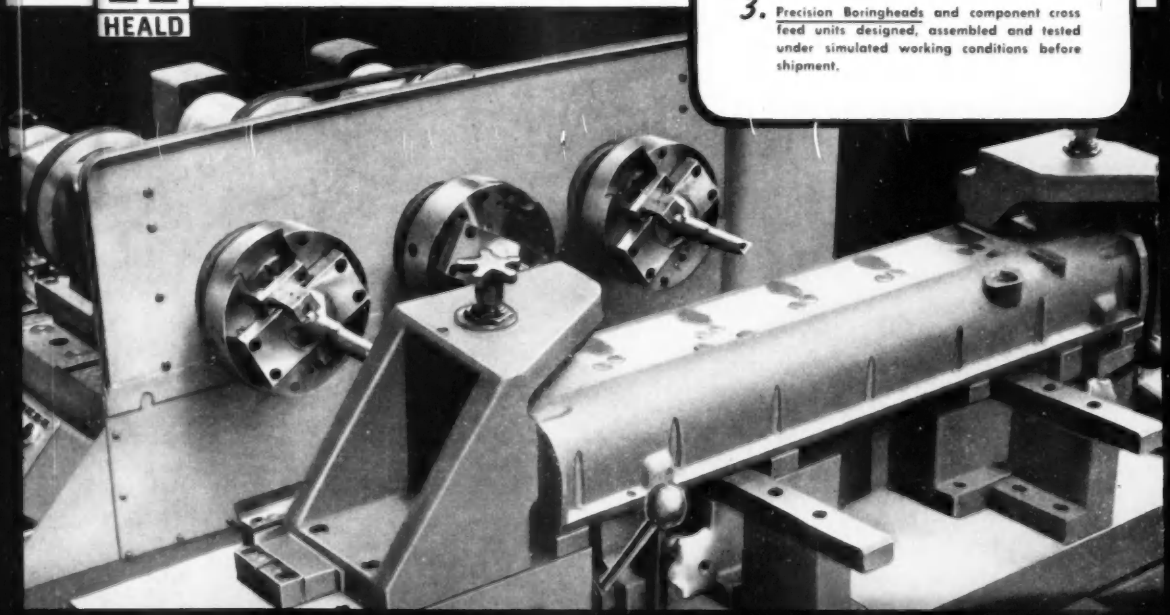
Heald Model 521 Borizes Tractor Cam Shaft Housings with consistent size and finish day after day after day!

HERE'S WHY

1. Constant Feed Hydraulic System — maintains size and finish requirements consistently throughout longest production runs.

2. Accurate Indexing — precision ways and cross slides provide maximum efficiency in positioning work and tooling.

3. Precision Boringheads and component cross feed units designed, assembled and tested under simulated working conditions before shipment.



for fast-freight...cross country

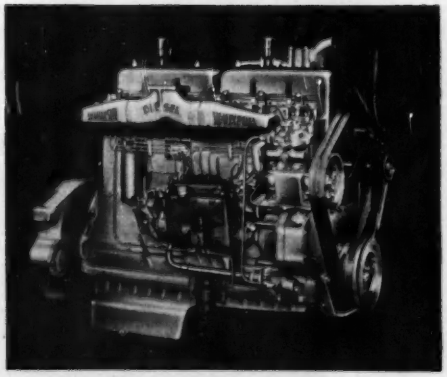
THE PAYLOAD POWER PLANT—

WAUKESHA *Diesel*

• This is a truckers' engine! Most modern in design! And designed for the specific purpose—power for payload! That's fast freight power... cross country power... cost-cutting power. You get it with this Waukesha High Duty Diesel—Model 148-DK—peak horsepower 200.

Of all its exclusive Diesel design features — the biggest is the patented spherical combustion chamber. It's the *why* of payload power performance—clean burning, lively acceleration, smooth, shock-free operation, high fuel economy with low maintenance.

Other big features — American Bosch injection; hardened and counter-balanced crankshaft with torsional vibration dampner; renewable wet sleeve cylinders; oil-cooled pistons, each with 4 rings, top ring chrome plated; built-in oil cooler. These and all the rest are described and pictured in Bulletin 1532.



148-DK High Duty DIESEL — six cylinder, 5¼-in. bore x 6-in. stroke, 779 cu. in. displacement, peak hp 200.

WAUKESHA MOTOR COMPANY • WAUKESHA, WISCONSIN

NEW YORK TULSA LOS ANGELES

140

NICKEL { *A tough, corrosion-resisting metal with other unique characteristics*

In addition to its electronic and magnetostrictive characteristics, its electrical properties and its high transformation point, Nickel provides:

● **Toughness.** Nickel is one of the toughest of metallic materials as measured by the Izod or Charpy impact tests. One of its outstanding properties is its retention of impact strength and ductility at sub-zero temperatures.

Material	Condition	Impact Strength ft.-lb. Izod	Charpy U-Notch
Nickel	Hot-rolled	120+	197
	Cold-drawn	120+	195
	Annealed	120+	222

● **Endurance Limit.** Indicative of the amount of loading tolerable under cyclical changes of stress, these endurance limits were determined in a 10,000 rpm rotating-beam machine for polished specimens at room temperature.

Material	Condition	Endurance limit for 10 cycles psi	Tensile Strength psi	Endurance ratio
Nickel	Annealed	23,000 – 25,000	74,000 – 75,000	0.31 – 0.33
	As cold-drawn	38,000 – 45,000	98,000 – 126,000	0.36 – 0.40

● **Corrosion Resistance.** Nickel is a relatively noble element; in the physical chemists' electromotive series, it is shown to be 0.21 volts more noble than iron. As a general rule, oxidizing conditions favor corrosion of nickel while reducing conditions retard corrosion. Nickel is resistant to fresh and salt water, exhaust gases, and most organic acids and compounds.

● **Rigidity.** As measured by the modulus of elasticity in both tension and shear, the rigidity of nickel is practically the same as that of steel. Young's Modulus (in tension) is 30 million psi., and the modulus in shear is 11 million psi.

● **Shear Strength.** Shear tests in double shear on nickel bars showed 52,000 psi for annealed, 58,000 psi for half-hard, and 75,000 psi for full-hard.

● **Workability.** Nickel is easily worked by the common methods of fabrication: Machining, forging, spinning, drawing, bending and forming.

● **Welding, Brazing and Soldering.** Nickel can be joined by the usual welding, brazing and soldering processes common to industry.

● **Forms Produced.** Nickel is supplied in most commonly used mill forms—rods, flats, rounds, hexagons, sheet, plate, strip, bar, wire, and seamless tubes.

FOR FURTHER INFORMATION

ENGINEERING PROPERTIES OF NICKEL is a comprehensive Technical Bulletin, punched for ring book insertion, and will be sent, **free**, on request for *Technical Bulletin T-15*. For technical help on specific high-temperature metal problems, write to *INCO's* Technical Service Section.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

INCO **Nickel Alloys**

MONEL® • "R"® MONEL • "K"® MONEL • "KR"® MONEL
"S"® MONEL • NICKEL • LOW CARBON NICKEL
DURANICKEL® • INCONEL® • INCONEL "X"®

Minimum Mechanical Properties of Nickel

Temper and Size Range	Tensile strength 1000 psi	Yield strength 0.2% offset 1000 psi	Elongation in 2 in. per cent
COLD-DRAWN WIRE (IN COIL)			
Annealed	55	15	40
Regular Temper	105		4
COLD-DRAWN ROD AND BAR			
Annealed			
Rounds, Squares, Flats, Hexagons – all sizes	55	15	40
As Drawn			
Rounds, Squares, Flats, Hexagons – all sizes	65	40	10
HOT-ROLLED ROD AND BAR			
Rounds, Squares, Flats, Hexagons – all sizes	60	15	40

Form and Size Range	Tensile strength 1000 psi	Yield strength 0.2% offset 1000 psi	Elongation in 2 in. per cent
FORGED ROD AND BAR			
Hot Finished	65	20	40
Annealed	55	15	40
PLATE, SHEET AND STRIP			
Hot-Rolled Plate			
Annealed	55	15	40
As Rolled	55	20	35
Cold-Rolled Sheet			
Annealed	55	15	40
Cold-Rolled Strip			
Annealed	55	15	40
Spring	90	70	2
SEAMLESS PIPE AND TUBING			
Cold-Drawn			
Annealed	55	15	40
Hard, Stress-Relieved	65	40	15
Stress Equalized	70	50	10

AUTOMOTIVE INDUSTRIES

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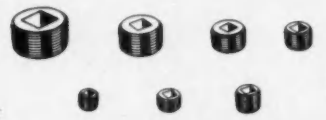
TOUREK

BALL JOINTS, PIPE PLUGS AND QUALITY SCREW MACHINE PRODUCTS

Ball Joints

• The use of Tourek Ball Joints — the only recognized standard — frequently brings about simplified design, improved performance and lower costs. A wide range of standard types is carried in stock to assure prompt delivery.



Pipe Plugs

• Accuracy, high strength and economy are yours by specifying Tourek precision countersunk pipe plugs. You get these advantages at costs which are competitive to old style plugs. Stock sizes, available with National Pipe or Dry-Seal threads are: ¼", ⅜", ½", ¾" and 1". Also available on special order in alloy steels, aluminum or brass in sizes up to 2⅜" diameter.

Screw Machine Products

• The Tourek plant is one of the largest and most modern in this field. It is equipped with the latest in high speed single and 6-spindle automatics, as well as complete secondary equipment including grinding and brazing. These production facilities—backed by 30 years' experience, assure you "The Best In Quality Screw Machine Products."

Depend upon Tourek for your screw machine product needs, in sizes up to 2⅜".

Free!

LITERATURE. Comprehensive data on any or all Tourek products sent promptly upon request . . . write for yours now. J. J. TOUREK MFG. CO., 4701 W. 16th St., Chicago 50, Illinois

TOUREK

"THE BEST IN QUALITY SCREW MACHINE PRODUCTS"

ESTABLISHED IN 1920

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PANGBORN ROTOBLAST* CABINET CLEANS UP TO 200 ENGINE BLOCKS AN HOUR

at world's largest independent jobbing foundry

ABOVE: This rear view of Campbell, Wyant, Cannon's Pangborn "ES" ROTOBLAST Cabinet shows the conveyor system and four ROTOBLAST Machines. Inside the cabinet, the conveyor stops in front of each ROTOBLAST unit and slowly revolves the casting in the blast stream for complete cleaning.

ROTOBLAST . . .

SAVES LABOR with push-button operation

SAVES SPACE because machines are compact

SAVES TIME by cleaning more loads per day

SAVES POWER since no compressor is needed

SAVES TOOLS because all scale is removed

BLAST CLEANING at Campbell, Wyant, Cannon Foundry Co., of Muskegon, Mich., is fast, efficient and *mechanized!* And the secret of this performance is two Pangborn "ES" ROTOBLAST Cabinets like that shown above. Heavy engine blocks can be cleaned at a rate of *200 an hour* . . . and cleaning is automatic! The result is faster, better, cheaper blast cleaning than ever experienced with other equipment.

Campbell, Wyant, Cannon started to mechanize their cleaning operation in 1937 . . . when they installed one of the first Pangborn monorail ROTOBLAST Cabinets. Later they installed a second Cabinet to meet production demands. As a result cleaning costs have been even further reduced, and there's no cleaning room bottleneck. Cleaning is a simple, automatic operation with high-quality work assured.

GET THE COMPLETE ROTOBLAST STORY: Bulletin 214 is informative and covers many applications. Write for your free copy to: Pangborn Corporation, 3900 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment.

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Pangborn

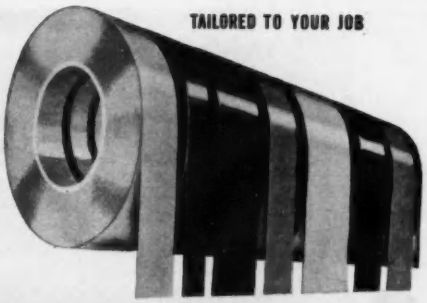
BLAST CLEANS CHEAPER
with the right equipment for every job

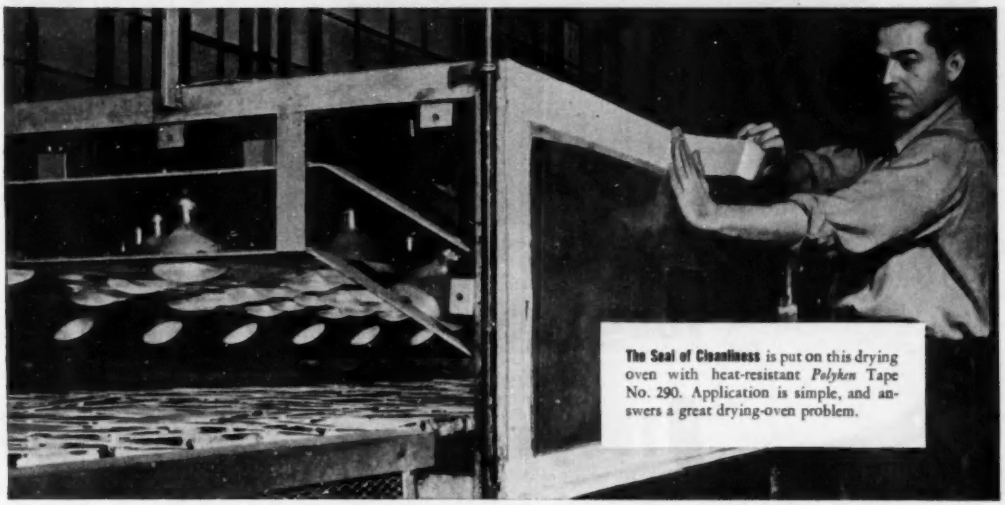
THE NEW

Polyken®

INDUSTRIAL TAPES

TAILORED TO YOUR JOB





The Seal of Cleanliness is put on this drying oven with heat-resistant *Polyken* Tape No. 290. Application is simple, and answers a great drying-oven problem.

They come clean when the heat's on!

When you guarantee metal tile not to rust, crack, craze, chip or peel, you can't gamble with any half-way measures. The Ohio Can and Crown Company, makers of Crown Metal Wall Tile, makes just such an iron-clad guarantee.

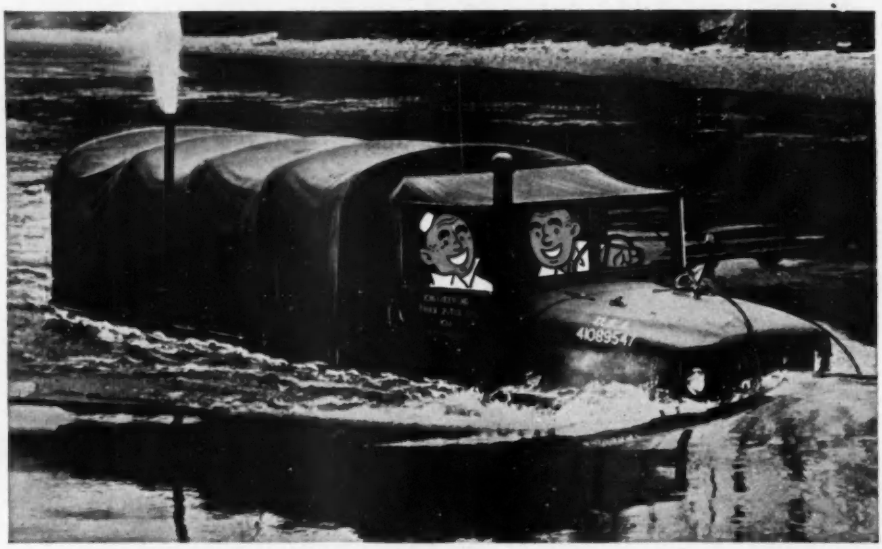
This means every step in the manufacture of these modern tiles must be tightly controlled.

One delicate operation was the drying oven. This oven is twenty feet long, and surface temperatures reach as high as 350 degrees. The many crevices and openings in the oven allowed dirt to filter through onto the conveyor line where the freshly enameled tiles were moving.

Since the oven had to be occasionally disassembled for thorough cleaning, it was impractical to caulk or weld these openings. A *Polyken* Sales Engineer, after testing, suggested *Polyken* Industrial Tape No. 290 for an efficient, timesaving seal. This tape has a flame-resistant adhesive, with a backing of heat-resistant woven glass cloth. Ohio Can and Crown now uses it exclusively for this sealing purpose. By withstanding the tremendous heat and sealing the dirt out, yet, because it strips off easily, No. 290 has solved a major problem in the oven-drying of enameled surfaces.

FREE SAMPLES. Write today for complete specifications and engineering data, plus samples of *Polyken* No. 290. Address *Polyken*, Dept. AIH, 222 West Adams Street, Chicago 6, Illinois.

Polyken Industrial Tape, Department of Bauer & Black, Division of The Kendall Company



Thirty vital Bundyweld parts in Reo-built Eager Beaver.

◀ Engine oil tube.

Tough job. Tough truck.

Tough tubing...Bundyweld

The job: Carry five tons a mile a minute, negotiate 60-percent grades, cruise 340 miles non-stop, operate from 65° below zero to 125° above, run in seven-foot-deep water, and more. *The truck:* Army Ordnance's 2½-ton powerhouse M-34 (Eager Beaver) built by Reo Motors. *The Tubing:* Bundyweld, top automotive tubing, in critical fuel, hydraulic brake, lubrication, and other systems.

Bundyweld is the only tubing double-walled from a single strip, with an exclusive beveled edge. It's copper-brazed through 360° of wall contact, extra-strong, leakproof, better performing in automotive products. Bundyweld forms easily, bends quickly to short radii without structural weakening. Its close tolerances reduce rejects, help production roll.

And if those new orders call for an "impossible" bend, you can rely on Bundy. We'll find a way to turn out your part. We'll produce it, too, and rush finished parts to you.

Today, find out what Bundy and Bundyweld can do for your product and production. Write: ***Bundy Tubing Company, Detroit 14, Michigan.***

Bundyweld® Tubing

DOUBLE-WALLED FROM A SINGLE STRIP

WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of basic metal, coated with a bonding metal. Then it's . . . continuously rolled twice around laterally into a tube of uniform thickness, and passed through a furnace. Bonding metal fuses with basic metal, presto— Bundyweld . . . double-walled and brazed through 360° of wall contact.

NOTE the exclusive patented Bundyweld beveled edge, which affords a smoother joint, absence of bead and less chance for any leakage.

Bundy Tubing Distributors and Representatives: *Cambridge 42, Mass.:* Austin-Hastings Co., Inc., 226 Binney St. • ***Chattanooga 2, Tenn.:*** Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • ***Chicago 32, Ill.:*** Lapham-Hickey Co., 3333 W. 47th Place • ***Elizabeth, New Jersey:*** A. B. Murray Co., Inc., Post Office Box 476 • ***Philadelphia 3, Penn.:*** Rutan & Co., 1717 Sansom St. • ***San Francisco 10, Calif.:*** Pacific Metals Co., Ltd., 3100 19th St. • ***Seattle 4, Wash.:*** Eagle Metals Co., 4755 First Ave. South ***Toronto 3, Ontario, Canada:*** Alloy Metal Sales, Ltd., 881 Bay St. • Bundyweld nickel and Monel tubing is sold by distributors of nickel and nickel alloys in principal cities.

For Interchangeable Bearing Parts
HYATT HY-LOADS

FOR easier, faster, more economical bearing installation, automotive engineers look to Hyatt Hy-Load Bearings because, with Hy-Loads, all separable bearing parts are freely interchangeable.

With freely interchangeable components, all necessity for tagging or matching related parts is eliminated.

Separate bearing elements can be mounted on the shafts or in the housings of sub-assemblies, at different locations, and then brought together at random with complete assurance that all bearing parts will mate perfectly.

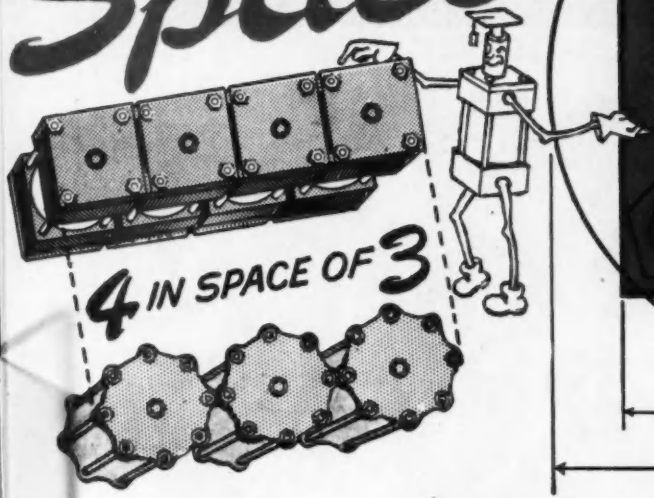
Precision manufacture makes this possible.

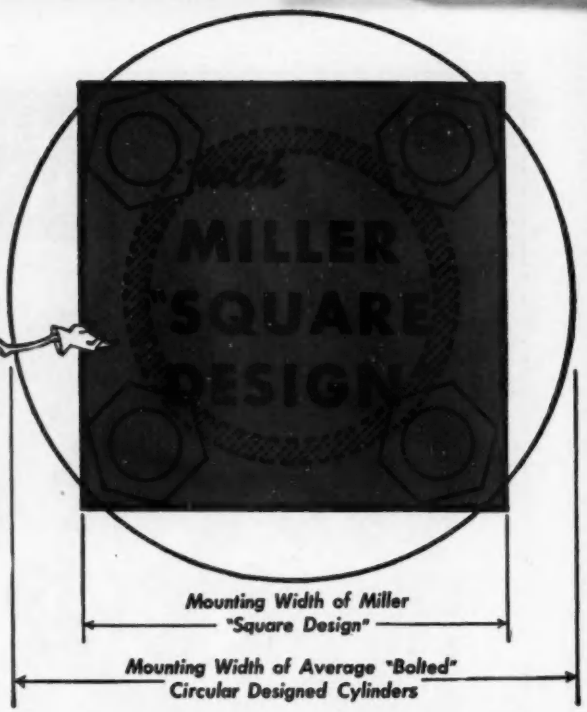
* * *

You can't afford to overlook this and the many other advantages of the Hyatt Hy-Load line of cylindrical roller bearings. Why not write today for complete information. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J., and Detroit, Mich.

HYATT ROLLER BEARINGS

Save Space



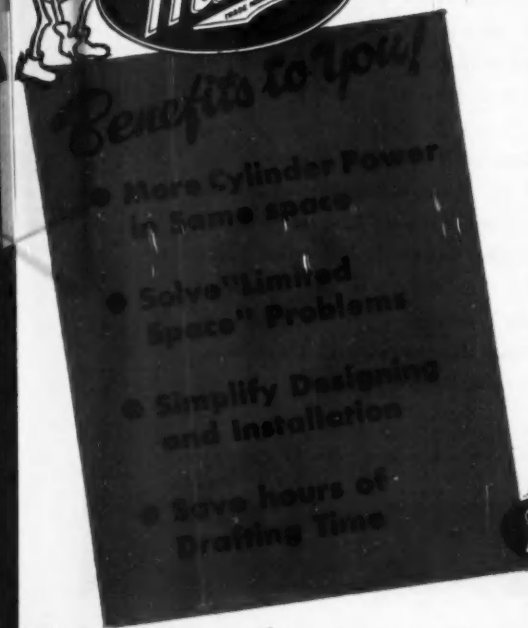


Air *and* Hydraulic CYLINDERS...

The SQUARE DESIGN of Miller Cylinders saves up to 25% of mounting space, permitting more cylinder power in the same space and easier, more convenient installation in "tight spots." Thus, in many cases, machines and equipment can be designed more compact and less costly by using Miller Cylinders. Hours of drafting time can be saved — as only a few straight lines show any view on drawings.

The illustration at upper left shows graphically how *four* Miller Cylinders can be mounted, bore for bore, in the same space required for *three* average "bolted" circular designed cylinders. Some Miller bore sizes permit even greater space-savings.

Other important *standard* features of all Miller Cylinders include: solid steel heads, caps and mountings, hard chrome plated piston rods, dirt wiper seals, and other "quality" features as shown in illustrated bulletins sent FREE on request. Remember, too, that Miller Hydraulic Cylinders (2000-3000 psi) meet the J. I. C. Hydraulic Standards.


Benefits to you!
More Cylinder Power in Same space
Solve "Limited Space" Problems
Simplify Designing and Installation
Save hours of Drafting Time

Write for illustrated cylinder bulletins A-105 and H-104

COMPLETE MILLER CYLINDER LINE INCLUDES: AIR CYLINDERS, 1½" to 20" BORES, 200 PSI OPERATION; LOW PRESSURE HYDRAULIC CYLINDERS, 1½" TO 6" BORES FOR 500 PSI OPERATION, 8" TO 14" BORES FOR 250 PSI; HIGH PRESSURE HYDRAULIC CYLINDERS, 1½" TO 12" BORES 2000-3000 PSI OPERATION. ALL MOUNTING STYLES AVAILABLE.

MILLER MOTOR COMPANY

2028 N. Hawthorne, Melrose Park, Ill.

AIR AND HYDRAULIC CYLINDERS — ACCUMULATORS — COUNTERBALANCE CYLINDERS — BOOSTERS — AIR HOISTS

CLEVELAND — PITTSBURGH — PHILADELPHIA — DETROIT — YOUNGSTOWN — BOSTON — HARTFORD — NEW YORK CITY — DAYTON — ST. PAUL — FORT WAYNE — INDIANAPOLIS — MILWAUKEE — NASHVILLE — SEATTLE — LOS ANGELES — SAN FRANCISCO — BALTIMORE — ST. LOUIS and OTHER AREAS.

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DEDICATED TO THE SAFETY AND CONVENIENCE OF MOTOR TRANSPORTATION

Ross

▶ *Nearly 50 years of specialization* in steering research, engineering, design and manufacture are typified by this bronze plaque on the Ross Engineering And Research Laboratory . . .

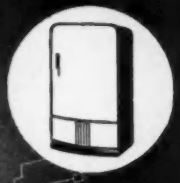
▶ *Within these walls* versatile thinking, ingenuity and enthusiasm watch over advanced testing equipment . . . crowding into *minutes and hours* extreme shocks and stresses that exceed *many years* of normal steering operation . . .

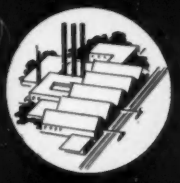
▶ *The Ross Laboratory* is insurance that pays its own premiums . . . new, finer steering performance, safety and economy for every peace-time and wartime need.

Cam & Lever **STEERING**

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

applications unlimited





There is almost no limit to the number of ways Western Felts are serving today. Technical design and production specialists for decades have been in close cooperation with manufacturers of products employing felts for such purposes as absorbing vibration, retaining lubricants, excluding dust and grit, filtering gases and liquids, controlling temperatures and sound, firming and lining apparel, covering furniture, clothing people; for padding, packing, sealing, grinding, polishing, etc. It can be made waterproof and fungus-proof and flame resistant. It will pay you to place your felt requirements in the experienced hands of Western Felt. Its counsel and products will prove profitable. In whatever way you use it, Western Felt will add materially to improving your product. Insist upon WESTERN FELTS!

Over 300 Grades Produced

Sheets • Channel • Filters
Washers • Grommets
Absorbents • Wicking
Padding • Cut Parts

WESTERN Felt WORKS
4035-4117
Ogden Avenue
Chicago 23, Illinois

MANUFACTURERS AND CUTTERS OF WOOL FELTS

From Bumper to Tailgate . . .

N-A-X HIGH-TENSILE STEEL

Reduces Deadweight and Increases Durability

The widespread use of N-A-X HIGH-TENSILE steel in transportation equipment emphasizes two vital characteristics of this high-strength low-alloy steel.

1. *Strength with less deadweight.* N-A-X HIGH-TENSILE steel reduces deadweight . . . of great importance in transportation equipment and military vehicles.
2. *Exceptional durability.* N-A-X HIGH-TENSILE steel, with its high strength and toughness, has proved greater resistance to fatigue and impact at normal and sub-zero temperatures. Its inherent structure and composition greatly reduce the effects of abrasion and corrosion.

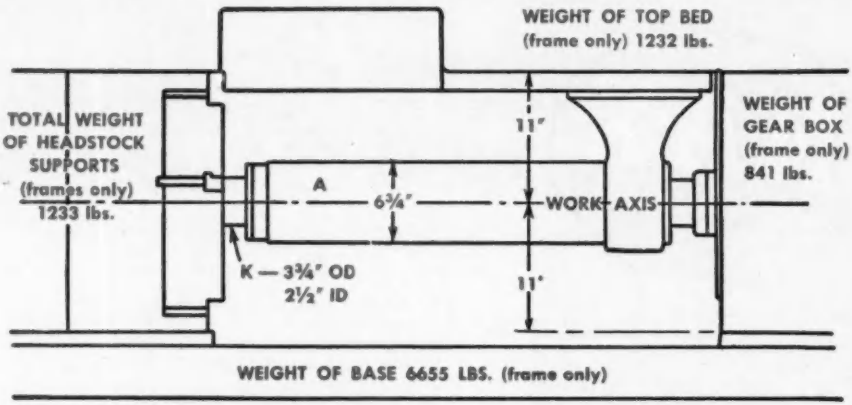
The response of N-A-X HIGH-TENSILE steel to severe cold-forming operations and its excellent weldability by electric arc or resistance, atomic hydrogen or heliarc, and all other processes, are added important characteristics of N-A-X HIGH-TENSILE steel.

The "Eager Beaver"

The use of low-alloy, high-strength steels in military equipment assures longer life with less deadweight.

GREAT LAKES STEEL CORPORATION
N-A-X Alloy Division • Ecorse, Detroit 29, Michigan

NATIONAL STEEL CORPORATION



MAKER OF "HISTORIES"

The above drawing illustrates a Tooling Area that has staged many outstanding cases of machine adaptation and performance. Case histories are very useful as examples of machine adaptation, but their blanket use as unqualified proof of dependable performance is not convincing.

Buyers know that varying requirements and conditions of various plants make "buying what the other fellow buys" an unsafe practice. They know that good case histories will result if machine facilities have been properly selected. No plant could long afford to have it otherwise.

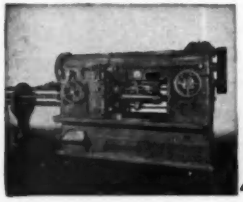
A "top performer" of the 1½" SIX SPINDLE CONOMATIC TOOLING AREA, shown above, is the MAIN END SLIDE. The specific data given tells why:

1. **It has a greater maximum load recommendation and a stronger frame support than the main end slide of any other "automatic".**

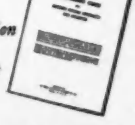
   The 272 lb. alloy carburized steel Main End Slide, A, is 33⅝" long, and has a maximum load recommendation of 4800 ft. lbs. Its round surface is machined to close limits. It is supported in nickel iron, split, sleeves on the alloy steel Way, K, with a total bearing of 136.9 sq. ins.

2. **It handles more work; has more adaptable tooling positions, and more selective feeds, than the main end slide of any other "automatic".**

   The 27⅞" tooling-length of the Slide handles shaft jobs up to 18" in length. The 2⅝" swing clearance permits die-head threading to full machine capacity in any, or all, six positions without Slide alteration. Nine pairs of pick-off gears give 68 feed changes for each work spindle speed.



Buyer's Comparison Chart will guide you to full information



A Comparison of ALL Automatics is in Favor of Cone

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

Wean-Hallden
LOW COST SYNCHRONIZED AUTOMATIC SHEAR LINES

THE installation of a Wean-Hallden Synchronized Automatic Shear Line assures you the most efficient shearing operation available today. The Wean-Hallden, while actually requiring *less floor space*, delivers up to *twice the production.*

Infinite variable lengths from 12-inches to 12-feet at speeds up to 200 FPM with accuracy better than commercial tolerances means faster production, reduced labor costs and minimum scrap loss for you. *Before You Buy—Investigate Wean-Hallden.*

Wean *Equipment Corporation*
CLEVELAND, OHIO

The Sign OF SMOOTH, SURE STOPS!

THE INDUSTRY'S FINEST POWER BRAKING SYSTEMS

More than two and a half million installations have made Hydrovac the undisputed leader in the field of power braking. And now Bendix Products offers Air-Pak, an air-hydraulic unit similar in design and principle to the Hydrovac. Air-Pak changes air pressure into hydraulic pressure by means of two direct connected pistons, thus combining all the well proven advantages of hydraulic brake action with an air brake system.

Products of twenty-five years of practical braking experience, these outstanding power braking systems offer faster, more positive and better controlled braking. And in both the vacuum and the air actuated units, brakes can be applied instantly by foot power alone—a safety factor of tremendous importance.

Remember, regardless of size of vehicle or whether your preference is for vacuum or air brakes, for the industry's finest power braking systems be sure to specify Bendix® Hydrovac® or Bendix Air-Pak.

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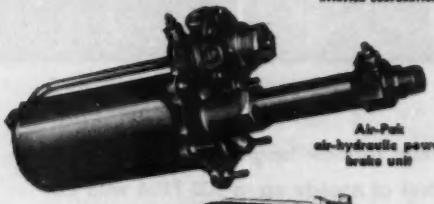
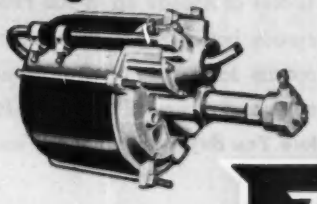


Air-Pak air-hydraulic power brake unit



Hydrovac vacuum-hydraulic power brake unit

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High Spots of This Issue

News of the Machinery Industries

Called to attention in this issue is an added New Feature. Dedicated to News of the Machinery Industries, the first installment begins on page 54.

★ **Nationalization—a New Truman Doctrine**

The oil crisis in Iran has produced a new socialistic policy by our Government. This is pointedly commented upon in an Editorial by James R. Custer. Page 32.

★ **Building a Bus Per Hour**

In a newly equipped plant ACF-Brill Motors Co. is turning out 200 buses monthly. How the unique assembly line setup accomplishes this is told by Thomas Mac New. Page 34.

★ **A History of Automatic Transmissions**

In chronological order this account presents brief descriptions and applications of semi- and fully-automatic transmissions that have been produced, or scheduled for production, since 1904. Page 36.

★ **Advanced Methods in Making Jet Engine Parts**

How Pratt & Whitney Division of United Aircraft surmounted the most difficult production problems posed in designs of new axial-flow gas turbine engines specified by the U. S. Air Force and Navy, is herein fully reported. Page 38.

★ **Vauxhall Plant Tools Up for New Model**

Preparations for launching a new car model within a few months at the Vauxhall Plant, Luton, England, present a scene quite comparable to plants around Detroit, U. S. A. See page 42.

★ **24 New Products Items And Other High Spots, Such As:**

Facts that refute alleged concentration of defense contracts; a fully demountable twin-hull assembly buck for seaplanes; LeSabre features light alloy construction; cold spin-dimpling process for light alloy sheets; special equipment in Cadillac's tank plant; the Business Pulse; and Rolls-Royce develops heavy-duty Diesels.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

How to Take *Chance* Out of Today's Alloy Buying

Here's a spark tester checking bars of Ryerson alloy steel. By reading the spark pattern thrown off when each bar is touched with this whirling, abrasive wheel, the tester determines the steel's analysis. In this way he verifies quality—guards against mixed steels.

Spark testing is only one of many steps in the Ryerson Certified Steel Plan for safer alloy buying—a plan especially important to you today, while restrictions are enforcing the use of leaner alloys with unfamiliar heat treatment response.

We also put every heat of Ryerson alloy steel through four separate hardenability tests, carefully recording the results on a Ryerson Alloy Certificate which goes with the steel. These tests enable you to buy Ryerson alloys on the basis of hardenability as well as analysis—the safest way to buy under today's changing conditions. And the recorded test results safely guide your heat treatment.

So play safe. Order from Ryerson where you can specify hardenability and be doubly sure. Stocks are out of balance from a size standpoint, but in all probability we can take care of your requirements.

PRINCIPAL PRODUCTS

CARBON STEEL BARS—Hot rolled and cold finished

ALLOYS—Hot rolled, cold finished, heat treated

STRUCTURALS—Channels, angles, beams, etc.

STAINLESS—Allegheny bars, plates, sheets, tubes, etc.

PLATES—Many types including Inland 4-Way Safety Plate

REINFORCING—Bars and accessories, spirals, wire mesh

SHEETS—Hot and cold rolled, many types and coatings

BABBITT—Five grades, also Ryertex plastic bearings

TUBING—Seamless and welded, mechanical and boiler tubes

MACHINERY & TOOLS—For metal fabrication

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DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

News of the AUTOMOTIVE INDUSTRIES

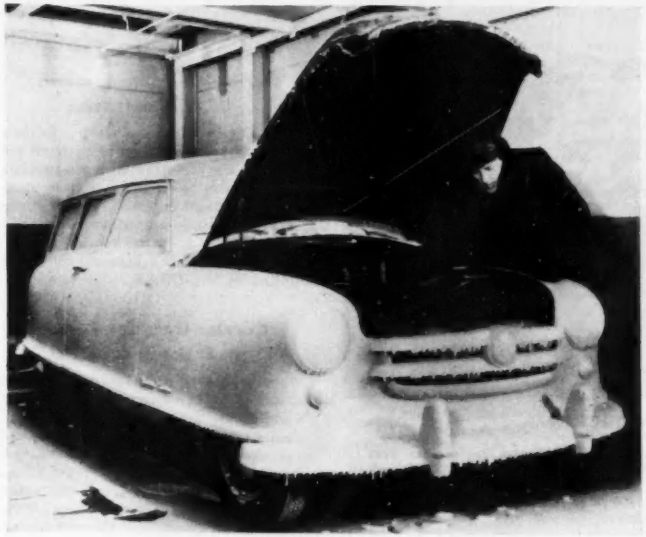
Vol. 105, No. 4 August 15, 1951

Car Companies Ask for Price Boosts

Most automobile companies are going ahead with plans to ask for price increases under authority of the new defense production act. Chrysler and Ford were the first when they submitted to NPA their figures showing that costs had increased about 9½ per cent since the start of the Korean war. Chrysler did not say definitely that it was asking for a price increase of that amount, but it is understood that the industry will generally ask for some price relief, although it is not certain that any company will take advantage of its full cost increase. Costs have been mounting and earnings have been going down, and it is certain that some advances at least are on the way. Meanwhile, Polk & Co. reports that new car sales in June are estimated at about 450,000, a decrease of seven to eight per cent from May. New truck sales are estimated at 86,000, compared with 90,000 the previous month.

Packard Six Months Net Climbs to $4.8 Million

Packard has reported a net profit of more than $4.8 million for the first six months of this year, compared with a net loss of $736,682 in the same period a year ago during which the company brought out a new model. Packard turned out nearly 46,000 cars the first half of 1951, an increase of 44 per cent over the same period a year ago.



MIGHTY CHILLY

In Nash Motor's cold room at Kenosha, Wisc., it's —20 F, and engineers testing engine performance must wear Arctic garb. Oil reaction, starting, and overall engine operation are tested under freezing conditions to improve winter driving. Temperatures of —40 F can be registered in the cold room.

Chrysler to Expand Plant in Los Angeles

Chrysler Corp.'s Maywood (Los Angeles area) plant will be increased from 400,000 to 1.2 million sq ft and employees increased from 1700 to 3800, L. L. Colbert, president, said on a recent visit to Los Angeles. The expanded space is necessary to handle defense contracts. The nature of the work could not be disclosed for security reasons. After the defense contracts are completed, Mr. Colbert said that the increased facilities will be used entirely for the production of Chrysler cars. He also looks for higher automobile prices and cited increasing costs for steel, labor and other factors involved in automobile manufacturing.

Ford Plans $43 Million Steel Expansion

Expected to add 190,000 tons of finished steel capacity annually, a $43 million program of expansion and modernization of steel operations in Ford Motor Co.'s Rouge plant is to be completed by March, 1953. Scheduled are 37 new coke ovens, a new sinter plant, installation of new pig casting equipment and extensive improvements in the open hearth and rolling mill facilities.

First Half U. S. Car Sales Hit 3.8 Million Units

U. S. factory sales of motor vehicles totaled 3,889,851 units in the first six months of 1951, according to the Automobile Manufacturers Association. This represents a slight increase over the 3,750,316 units produced in the first six months of 1950. Truck production for domestic use was 676,347 units in the first half of 1951, more than 80,000 units over 1950 production for a comparable period.

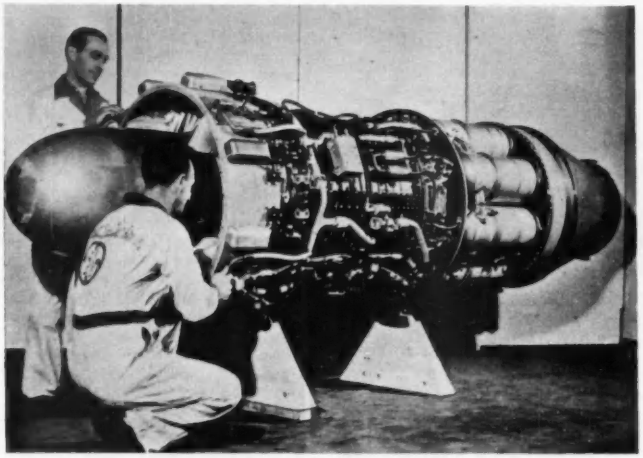
Industry Hit by Controls and Shortages

The additional five per cent NPA cut in automobile production scheduled for the fourth quarter hit an industry already just a little numb from the continued battering and buffeting of restrictive government orders, materials shortages, labor trouble, discriminatory price controls, and unbounded confusion and uncertainty about the future. In view of the incredible confusion brought on by the CMP program, plus the increasing shortage of critical alloy steel and

copper, there is some doubt that the industry will be able to complete the 1.2 million passenger cars allotted for the present quarter. July was a particularly disappointing month because of an unusual number of impediments to production including labor disputes and floods, besides the continuing problem of materials shortages. Estimated production for July was about 372,000 cars, which was approximately 110,000 below the June level and almost 40 per cent below July, 1950. However, there is a possibility that the industry will bound back in August or September so that the full 1.2 million units allowed by NPA during the present quarter may be built.

One of the big worries facing the industries today is what will happen if CMP collapses, as many in the automobile industry think is certain to happen. Reports from the steel industry are that CMP certificates have been issued for more materials than are available and many priority holders are having their orders returned to them because the mills are booked up solidly for all of the material they are required to furnish under CMP orders. There is considerable opinion that copper and alloy steel may be the two materials that will regulate automobile production. Both of these items are extremely critical and there is little prospect for improvement.

Prevailing opinion among some of the larger automobile companies is that, as a result of the CMP mess, they will be forced to reduce operations later this year and that the failure of government officials to recognize the very important factor of lead time will delay any effective relief measures several weeks. Actually the industry has been operating in recent weeks under materials restrictions imposed three to four months ago and the effects of the current tighter regulations will not be felt probably until the fourth quarter. In any event, the situation is hopelessly confused and snarled and no one in the industry has any clear idea of how it will all come out. All are sure, however, that the industry is not going to close down, but probably will be forced to struggle along at only a partial rate of about 60 per cent as high as the first six months of 1950.



PACKARD PRODUCING

Packard Motor Car Co.'s entire output of all-weather turbojet engines has been designated for the world's fastest known bomber, the Boeing B-47 Stratojet. Packard recently completed a licensing agreement to produce the General Electric Co.'s J-47-GE-23, which is now rated at more than 5800 lb of thrust, over 600 lb more than previously reported.

Autocar Awarded Big Truck Contract

The Autocar Co. has been awarded a multi-million-dollar government defense contract for the production of standard Autocar 10-ton cab and chassis. The Ordnance Dept. and Autocar said that production would start soon since the job will not require retooling.

Ordnance Continues Orders for Trucks and Engines

Military orders for trucks and parts continue to come into the automotive industries. Hercules Motors Corp. has been awarded an order for 3266 engines with accessories in the amount of $1.6 million. Willys-Overland has added two contracts totaling $1,456,000 for 555 one-quarter ton trucks and 1773 hard top truck cabs. White has also received two additional orders, calling for 3500 radiator assemblies and nearly 75,000 automotive spare parts. Total of the two orders is $443,000.

Gerity-Michigan Receives USAF Contract

The Gerity-Michigan Corp., Adrian, Mich., has received a contract from the U. S. Air Force to install a magnesium casting plant to produce rough magnesium castings for supply to various aircraft engine manufacturers. The building will be provided by Gerity-Michigan and the equipment is to be supplied by the USAF.

Carrier Gets Jet Parts Subcontract

A subcontract for large-scale production of axial compressors and other major components of the GE J-47 turbojet engine—one of several defense orders totaling over $50 million—has been disclosed by Carrier Corp. Carrier will serve as a subcontractor to GE's Aircraft Gas Turbine Divisions. Cloud Wampler, Carrier president, reported that execution of the jet parts contract would utilize in its entirety a new and completely air conditioned plant in Syracuse, N. Y., providing some quarter million square feet of manufacturing space.

Ternstedt Gets Contract for Compass Systems

GM's Ternstedt Div. has received a defense contract form the Air Force for production of N1 compass systems. The division will produce the compass system under a licensing agreement with Kearfoot Co., Inc. of Little Falls, N. J., which developed the instrument. It will be produced in the Ternstedt instrument plant which occupies a section of GM Transmission Div. just west of Detroit. Many of the components will be purchased from suppliers.

INDUSTRIES

GM Starts Building Big New Jet Parts Plant

Construction of a big GM plant in Syracuse, N. Y., for the manufacture of stator blades for Wright J-65 jet engines has begun. The plant for which the site is being prepared will make stator blades under contract with GM's Buick Motor Div.

USAF Plans Six Permanent Defense Clinics

Six permanent Air Force defense clinics, designed to aid small business firms in the Midwest, will be activated in the near future. These permanent exhibits will display the actual parts needed by defense plants that are building air materiel and planes under Air Force contracts. The six permanent exhibits will be located at Chicago, Milwaukee, Minneapolis, St. Louis, South Bend, and Indianapolis.

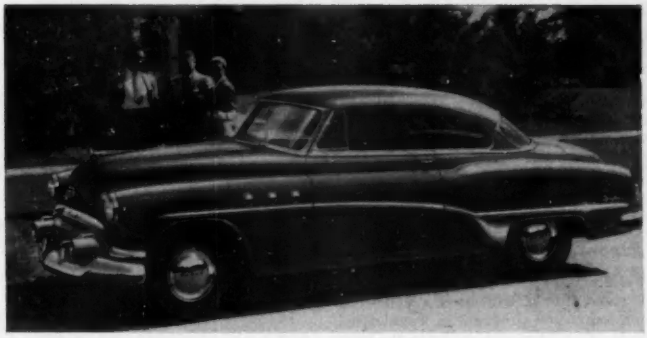
Republic Aviation Leases New Facility

A new building now under construction in Greenlawn, L. I., N. Y., will be leased and operated upon completion by the Republic Aviation Corp. Republic will utilize the 46,000 sq ft of factory area for the production of jet fighter parts.

Step-Up in Canadian Aircraft Activity

Canada's self-sufficiency in aircraft production took a major step forward with the announcement of two new production schemes. A. V. Roe Canada, Ltd., announced jointly with Chatco Steel Products Ltd., that Chatco would begin almost immediately to build major components for the RCAF's CF-100 long-range jet fighter at Tilbury, Ont., Canada. Tooling and installation of equipment for the multi-million dollar job has already started. Between 800 and 1000 men will be employed. Chatco will build rear center section fuselages, rear fuselage sections, tailplanes, rudders, fins and tailcones.

At Scarboro, Ont., it was announced that excavation had started for a $2.5 million building which will produce jet engine parts. Some 600 workers will be employed turning out fuel systems designed by Rotax Canada, Ltd., a subsidiary of Joseph Lucas Ltd., of Britain. Production was expected to start in February. Meanwhile at Malton, Ont., home of A. V. Roe, Canada's largest jet engine plant was rapidly taking shape. The plant is stiuated close to Avro's main factory and will turn out Orenda turbojets for the CF-100 by early 1952.



RIVIERAS IN QUANTITY

This is Buick's Riviera model in the special series which is now in quantity production. Although the hard top convertible model has been available in other Buick series, this is the first time that it has been made available in Buick's low-priced model.

Bellanca to Make Parts for Martin P5M-1

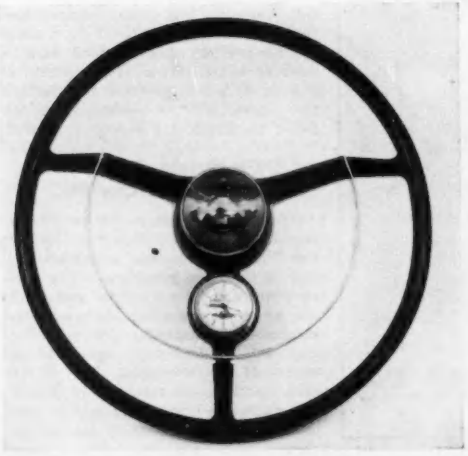
The Bellanca Aircraft Corp. New Castle, Del., has contracted with the Glenn L. Martin Co., designers and manufacturers of the P5M-1 Marlin, to build parts of the towering tails of the big flying boats—the fins, rudders and rudder tabs.

U. S. Air Force to Take Over Plant in Rochester, N. Y.

The U. S. Air Force is taking over a plant in Rochester, N. Y., formerly used by the Odenbach Shipbuilding Co., and will convert the structure into a plant for the manufacture of aircraft equipment. The Air Force will reportedly lease the plant to the A. C. Smith Co. of Milwaukee.

Chevrolet to Build Two Wright Engine Models

Chevrolet has revealed that its aircraft engine contract involves two Wright engines instead of one as previously reported. They are the Wright R-3350-26W, and the Wright Turbo-Compound R-3350-30W. The 26-W, which develops 2700 hp is used in the Douglas Sky Raider, a one-engine, carrier-based attack bomber; the T-2V3



WATCH ON THE WHEEL

Mounted on the steering wheel, Oldsmobile's new 15-jewel car watch has a Swiss movement. The turning of the steering wheel and the normal movement of the car actuate the watch's pendulum weights, winding the watch's movement. The watch is optional at extra cost on all 1951 Oldsmobile models.

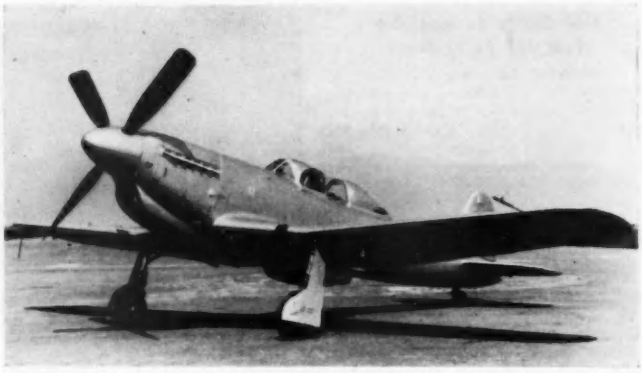
Lockheed bomber; and the commercial Lockheed Constellation. The 30-W, a 3500-hp engine, is used in the P-2V4 Lockheed Neptune, a long range two-engine bomber; the Martin P-5M anti-submarine control bomber; and the C119 Fairchild Packet. Chevrolet has ordered the steel for its plant expansion at Tonawanda, N. Y., which will include three new aircraft engine buildings.

Chevrolet Plans $20 Million Expansion in Tonawanda, N. Y.

GM's Chevrolet Motor Div. has announced that it will start a $20.8 million expansion program in Tonawanda, N. Y. The expansion calls for the erection of three buildings containing nearly 1 million feet of floor space. The new structures will include a 230,000-sq-ft addition to the engine plant, a 230,000-sq-ft forge plant and a 370,000-sq-ft foundry. Chevrolet executives indicated that the expansion will start this summer. The new facilities will be used to augment the division's present manufacturing capacity in Buffalo for the production of Wright R3350 aviation engines for the U. S. Air Force and Navy, according to T. H. Keating, GM vice president and Chevrolet general manager.

NPA Sets Truck Output Quotas

It's a good guess that although the Defense Transportation Administration settled with NPA for sufficient allocations of materials to continue truck production at a 1.1 million rate, DTA still has its sights set on its original goal of a rate of more than 1.3 million trucks and tractors. It will try to get the allocation increased later. In the meantime allocations of materials will be distributed among truck builders on the following percentage basis: Heavies—IHC, 27.2 Ford, 13.1; Dodge, 13.1; GMC, 12.6; White, 9.9; Mack, 9.2; Diamond T, 3.4; Reo, 2.7; Brockway, 1.8; Autocar, 1.7; and all others less than 1 per cent each. Mediums—Chevrolet, 33.3; Ford, 26.8; IHC, 13.2; Dodge, 12.8; GMC, 7.0; Studebaker, 5.0; and Diamond T, Divco, Federal, Nash, Reo, White, and FWD, fractional. Lights—Chevrolet, 34.9; Ford, 21.1; Dodge, 13.4; Willys, 8.8; IHC, 8.7; GMC, 7.6; Studebaker, 4.6; and Pontiac, Crosley, and Divco, each fractional amounts.



HIGH SPEED TRAINING

With a top speed of 370 mph, this Fiat G59/4 airplane is designed for use as a high speed, all-weather trainer. The Fiat G50, from which this airplane is developed, is of all-metal construction, and is powered by a Rolls Royce Merlin T 24-2 engine, which develops 1420 hp at take-off.

USAF Awards $50 Million Contract to Canadair

The award of a contract understood to be for 300 new-type planes for the U. S. Air Force was announced by John Jay Hopkins, president of Canadair Ltd. The order reported to be worth $50 million will be filled at the company's plant in Cartierville, Quebec, Canada. The announcement said that the new plane is the T-36, a twin-engine military plane which can be used as a trainer or a transport. It also said "an unspecified number" of the planes will be produced for the Royal Canadian Air Force.

Curtiss-Wright Corp. Forms Metal Processing Div.

The formation of a Metals Processing Div. in Buffalo, N. Y., by the Curtiss-Wright Corp. was announced by Roy T. Hurley, president. The division will apply newly developed methods to make essential materials and products for aircraft. The new division will be the sixth operating division of the company, Mr. Hurley said. It will have a large and diversified capacity—enough to supply vital parts for a wide range of aircraft en-

1951 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

	Passenger Cars	Trucks	Buses	Total Vehicles 1951	Total Vehicles 1950
January	478,189	127,583	661	606,433	581,362
February	506,195	111,935	521	618,321	475,465
March	617,399	138,794	829	755,022	560,662
Total—Three Months	1,601,853	376,312	2,011	1,980,176	1,637,489
April	503,038	135,415	819	639,272	559,311
May	511,938	140,047	742	652,727	696,693
June	482,027	134,811	838	617,676	856,814
Total—Six Months	3,099,856	786,585	4,410	3,889,851	3,750,307

1951 DOMESTIC TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-26,000	Over 26,000	Total
January	50,435	21,029	6,476	16,857	5,529	5,567	3,160	109,262
February	43,207	16,940	6,639	14,767	4,676	5,320	3,285	94,834
March	52,948	25,003	9,487	17,987	3,719	5,786	3,305	118,235
Total—3 Mos.	146,590	62,972	22,602	49,719	13,927	16,773	9,802	322,385
April	51,290	21,638	11,179	18,605	5,165	6,304	3,302	117,483
May	52,991	22,062	11,389	19,637	5,052	6,652	3,458	121,461
June	51,390	22,181	7,854	19,266	4,683	6,875	2,823	115,072
Total—6 Mos. 1951	302,261	128,873	53,024	107,419	28,823	36,594	19,353	676,347
Total—6 Mos. 1950	284,781	122,532	41,546	87,508	20,710	17,877	12,610	587,654

*—Automobile Manufacturers Association.

gines. Mr. Hurley said that Curtiss-Wright technicians have developed new metallurgical processes which will contribute substantially to production of jet engines with higher power and lower fuel consumption.

DPA Authorizes Loans for Expansion

The Defense Production Administration has authorized 15 additional emergency loans totaling $9,806,378 for expansion of industrial facilities needed for defense. These are in addition to 33 loans previously authorized and the total amount of all loans issued to date is $70,627,882. Among the 15 additional emergency loans approved by DPA are: S. K. Wellman Co., Cleveland, O.—$3.8 million to acquire land, erect a building and purchase machinery and equipment; Tyson Bearing Corp., Massillon, O.—$1,275,000 to purchase and install machinery and equipment; Berea Rubber Co., Cleveland—$575,000 to erect a building and purchase machinery and equipment; and Schwien Engineering Co., Los Angeles, Calif.—$398,500 to purchase land for new plant and construct building.

Offer No Spin Differentials of Ford Trucks

Ford Motor Co. is now offering the NoSPIN differential on special order on its F-4, F-5, F-6, F-7 trucks. It can be installed on all single speed axles in the series and on F-5 and F-6 trucks with two-speed axles. The locking differential is installed in production on special order and is warranted by the manufacturer, the Detroit Automotive Products Corp.

Car Makers and Dealers Blast Excise Boost

Both manufacturers and dealers have wheeled up their heavy artillery to lambaste a proposed three per cent increase in Federal excise taxes on cars, trucks, buses, and replacement parts. Before the Senate Finance Committee, A. E. Barit, president of Hudson and chairman of the Automobile Manufacturers Association Taxation Committee, said that the increase is unfair and would further widen the present tax discrimination against automotive purchasers. He pointed out that automobile taxes already account for 29 per cent of the purchase price, and that a further increase would tend to defeat the purpose of increasing revenue because higher prices would cut sales, which in themselves generate income and tax revenue. He suggested instead that a five per cent manufacturers' excise tax be placed on all goods except food and clothing.

Charles C. Freed, a dealer from Salt Lake City and speaker for NADA, outlined the disparity between automobile taxes and other manufacturers' excises. He said that taxes on automotive products total $1.425 billion annually, while those on other items, many of them less essential, bring in only $310 million. He said that the proposed three per cent increase would add an additional $502 million a year to motorists' taxes while the proposed bill would lower other tax levies by more than $90 million. He also advocated a general manufacturers' tax across the board.

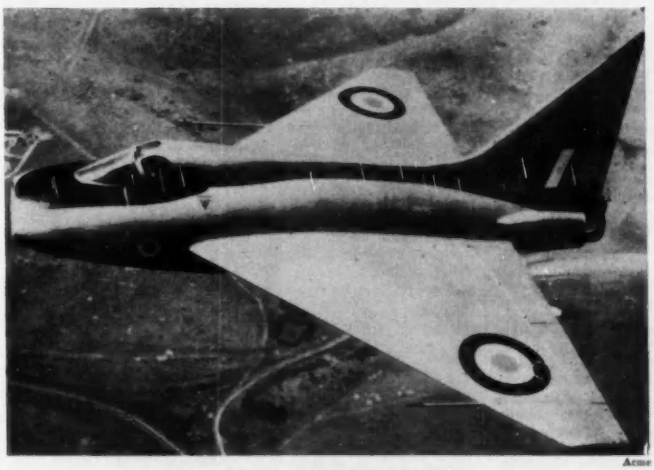
Name GM's Boyer as Head of DPA Aircraft Board

Harold R. Boyer, GM director of production engineering, has been appointed deputy administrator for aircraft production and chairman of the DPA's newly-created Aircraft Production Board. This board will have complete control over aircraft production. The Board will determine total aircraft requirements (military, commercial and civilian) and recommend allocation of materials for production. The Board will also explore means of insuring production, including the scheduling of aircraft components and materials, and expansion of facilities and production equipment. Shortage of special machine tools to produce jet engine parts is one of the most critical current problems.

Paris Car Show to Have 1200 Exhibitors

With 1200 exhibitors in all classes, this year's Paris automobile show will be the biggest ever and also one of the most international in Europe. There will be two sections, passenger cars and accessories, together with a limited number of truck chassis, being displayed in the Grand Palais on the Champs Elysées and trucks, motorcycles and cycles in three big halls, with a total area of 485,000 sq ft at the Porte de Versailles on the southwestern edge of the city. The show will be open from Oct. 4th to 14th. American representation will be strong, with the five GM makes, Chrysler, Plymouth, Dodge, De Soto, Kaiser-Frazer and Henry J, Hudson, Lincoln, Ford, Mercury, Nash, Packard, Studebaker and Willys. In the truck division Mack, White and Marmon-Harrington will be represented.

Practically the entire British industry will have stands in the show, with the exception of the Nuffield Group. All the Italian makers have reserved space. There will be eight German pas-



Acme

HIGH SPEED RESEARCH

Powered by a Rolls Royce Nene turbojet engine, this new delta-wing, single place jet, the Boulton Paul P111, is undergoing tests for the British Ministry of Supply for whom it was designed and built. It is being used for high speed aerodynamic research.

senger car manufacturers and the national Spanish industry will be represented in the private car division for the first time. By an agreement between national automobile manufacturers, the London show will not open until three days after the closing of the Paris display.

GM Second Quarter Net Dips to $139 Million

GM's net sales totaled $1921 million and net income was $139 million for the second quarter of 1951, compared to net sales of $1963 million and net income of $273 million for the second quarter last year. Net sales amounted to $3881 million for the first six months of 1951, and net income was $280 million, while for the first half of 1950, net sales were $3606 million and net income was $185 million. Second quarter Government sales, including work performed under defense engineering research and development contracts, totaled approximately $130 million, and for the first six months of 1951, totaled $230 million. Sales of cars and trucks produced in GM plants in the United States in the first six months of 1951 were 1,611,238 units and in 1950 were 1,801,208.

Continental Can Co. Buys Dixon Mfg. Co.

Continental Can Co. has bought the entire capital stock of the Dixon Manufacturing Co., Inc., of Coffeyville, Kans., contract manufacturers of aircraft components, according to William M. Cameron, vice president of Continental's Central (Metal) Div., who is now also president of this new wholly-owned subsidiary.

NEW PLANT FOR MILLER

The Miller Motor Co., Chicago manufacturer of air and hydraulic cylinders for machine tool equipment and other production equipment, has built a new plant comprising an area of about 50,000 sq ft at Melrose Park, Ill. The new plant represents the latest in modern plant design and layout.

Borg-Warner & Inland Steel Co-Produce Film

Borg-Warner Corp. and Inland Steel Co. are co-producers of a film "In Our Hands" which pictures various phases of life in America in contrast to conditions in other countries or under a different type of government. The film together with flip charts has already been shown to employees of some 43 firms, and is available to any company desiring to utilize it for an employee program.

May Have Mexican Stock Car Race in Mid-November

Another Mexican stock car race is tentatively scheduled for mid-November, 1951, according to a statement by the committee in charge. Last year's race was from Juarez, Mexico (opposite El Paso, Tex.), to El Ocotal on the Guatemalan border, a distance of 2178 miles. This year's course has not been determined yet.

Eaton to Spend Million to Expand Pump Plant

The Eaton Manufacturing Co. will spend about $400,000 for new equipment to be placed in a new addition to its Pump Div. plant at Marshall, Mich. Total expansion program cost will be $1 million. In addition to use in Army vehicles, the company's pumps are used in hydraulic steering mechanisms for large trucks, and also are used in the Chrysler power steering unit. Eaton says that it expects hydraulic steering to be adopted by other manufacturers.

New du Pont Alloy Base for Chromium Finish

In a development announced by the du Pont Co.'s Electrochemicals Dept., a "white brass" alloy is used to replace nickel as a base for chromium finish. This process is now the subject of intensive research work in the company's laboratories and in manufacturers' plants, and the company emphasized that there are still a number of technical obstacles to be overcome. Preliminary results indicate that chromium, plated over white brass, is indistinguishable in brightness and color from that plated on a nickel base.

Ford Develops Rough Road Testing Machine

Designed to permit inspectors to stand under, sit in, or walk around a car and observe reactions as it "travels"

BETTER FINISH

Oshkosh Motor Truck, Inc., Oshkosh, Wisc., has been using the hot spray method of applying lacquer to its heavy-duty, four-wheel and six-wheel trucks for more than a year. The company has recently issued a report, based on this experience, listing several advantages of hot-spray lacquer. One feature of the new method is elimination of bushing due to periods of high humidity during summer and fall which had created a slow-up problem for the Oshkosh concern. In addition, overspray is cut by the use of 60 per cent less thinners, and finish is said to be improved by a higher gloss.

over a jarring road at speeds of 7 to 42 mph is Ford Motor Co.'s newly-designed 30-ft long "rough road" testing machine. The machine was developed by the Ford Div.'s quality control gauge and test section. Built over an inspection pit, the new machine operates with four sets of motor-driven double-rollers, one for each wheel of the car. One of the rollers for each car wheel is a smooth drive-roller, accelerating the wheels of the car to any desired speed. The matching roller has a two-in. hump which, at high speeds, accurately simulates the twists and torsions of a car at it travels over roads.

Pullman Subsidiary Buys Trailmobile Co. Assets

The sale of the assets of the Trailmobile Co., to Trailmobile Inc., a wholly-owned subsidiary of Pullman Inc., was approved by 81 per cent of the stockholders recently. Officers of Trailmobile Inc. are: George M. Bunker, president; William A. Burns, Jr., vice-president and sales manager; J. B. Wharton, Jr., vice-president and treasurer; and Lloyd R. Everhard, secretary. Messrs. Bunker, Burns, Wharton and Everhard held corresponding positions with the Trailmobile Co. Mr. Bunker stated that there will be no change in the operations of the enterprise and the business of Trailmobile Inc. will be carried on in the future as it has been in the past by its predecessor.

Two to Establish Plants for Titanium Output

Encouragement for builders of jet engines, who have watched the raw materials problem grow to vast proportions, may be found in the signing of letters of intent, by two manufacturers, to establish plants for the production of titanium metal at the rate of 10 tons per day. Titanium Metals Co. and The du Pont Co. have been encouraged by Defense Minerals Administration to undertake quantity output of the light, corrosion-resistant metal.

Nash Netted $3 Million in June Quarter

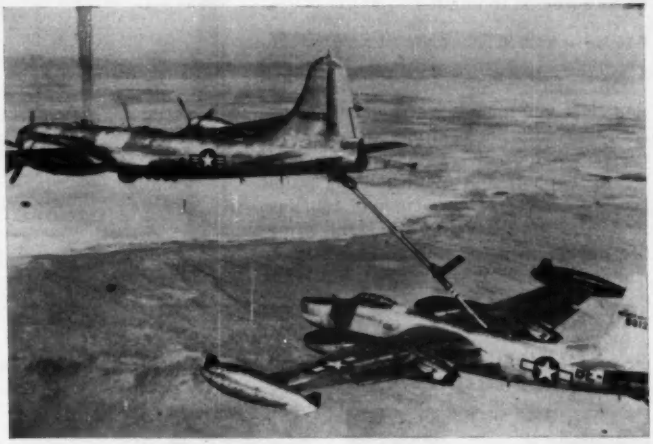
Nash-Kelvinator Corp. reported net earnings of $3,099,509 for the quarter ended June 30, 1951, compared with $10,052,117 in the June quarter last year. Sales for the June quarter this year were $107,120,691 compared with $132,829,364 in the June quarter a year ago. Net earnings for the nine months ended June 30, 1951, were $12,735,053 compared with $21,482,366 for the corresponding period last year. Sales for the nine months this year were $315,972,671 compared with $320,752,854 a year ago.

Groov-Pin Moves Into New Plant

The Groov-Pin Corp., formerly of Union City, N. J., is going to move into a new plant and general offices in Ridgefield, N. J., on Aug. 20. The new building is of one-story steel and brick construction, and provides 40,000 sq ft of space.

Firestone to Build New Plant in Venezuela

The Firestone Tire & Rubber Co. has disclosed plans for building a $4 million tire and tube manufacturing plant at Valencia, Venezuela. This new factory will have 100,000 sq ft of floor space initially, and will be equipped to produce 150,000 passenger car and truck tires annually. The plant will be known under the corporate name of Companima Anonima Firestone Venezolana.



AIR TO AIR

The first successful air-to-air refueling of a U. S. jet bomber has been carried out with North American's RB-45C Tornado. Transfer of fuel to the 550-mph bomber while in flight was accomplished with the Boeing-developed flying boom. The transfer of fuel was made in a relatively short time as the Tornado held steady about 15 ft to the rear and 20 ft below the tanker. The refueling point on the RB-45C is midway on the top of the plane's 75-ft fuselage.

Accurate Bushing Expands Plant

The Accurate Bushing Co. has just completed a considerable expansion of its plant and production facilities at Garwood, N. J. The manufacturing area has been expanded about 33 per cent and the addition of new equipment and improved plant layout has increased production facilities in the neighborhood of 100 per cent.

Battery Said to Start at —65 F

Under the sponsorship of the U. S. Army Ordnance Corps, a lightweight storage battery which is said to start a car at —65 F has been developed at the University of Michigan Engineering Research Institute. Designed to meet the exacting standards of widespread military operations, the new battery has reportedly withstood tests proving it to operate effectively at temperatures ranging from 165 F to —65 F.

Italy Ups Car Output 31% in First Half of 1951

With a total production of 78,887 automobiles of all types for the first six months of this year, the Italian factories boosted their output 31.2 per cent compared with the corresponding period of 1950. Passenger car figures were 64,581, trucks totaled 13,321, while buses were 985. The greatest increase was in passenger cars.

The finish that's only the beginning

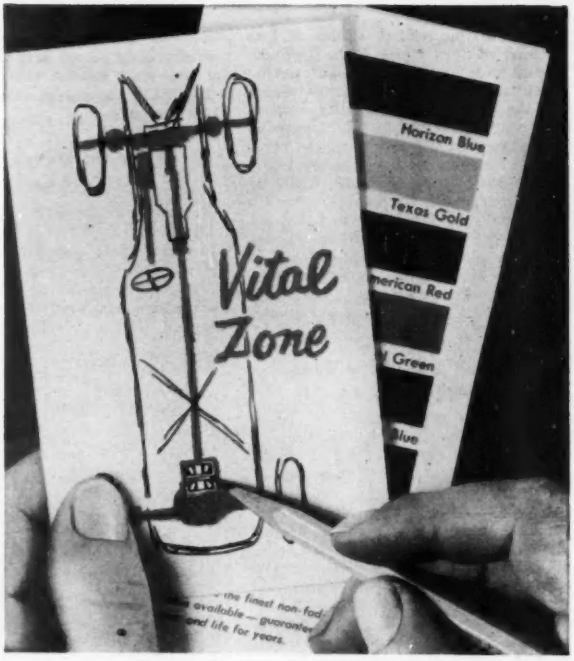
THE new, longer-lasting lacquers in exciting colors give today's cars the dash and sparkle it takes to capture the public eye. But no matter how attractive a car may be at first glance, motorists know that what counts most in the *long* run is *value!*

Motorists are becoming more value-conscious every day. You can give them what they want by giving value where it counts most—in the moving parts, the "vital zone".

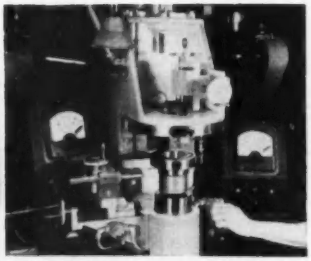
When buying "vital zone" parts for your car—pinion bearings, for instance—you may find it helpful to keep this simple guide to value in mind:

$$Value = \frac{quality + service + public\ acceptance}{price}$$

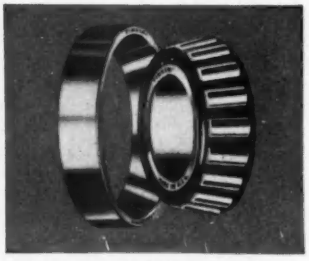
Obviously, a big advantage *above* the line gives you more value than a small one *below* it. No other bearing can match the uniform high quality, extensive and varied service support and overwhelming public acceptance you get with Timken® bearings. And in relation to value, Timken bearings are lowest in price today. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".



How TIMKEN® bearings give you value where it counts most . . . in the "vital zone":



PRECISION MANUFACTURE contributes much to the value you get with Timken bearings. This electronic gage for ground surfaces is typical of dozens of tests—many of them developed by our own staff—the Timken Company uses to insure precision in every Timken bearing.



TOUGHEST BEARING JOB in the car is on the pinion. And all but two makes of cars use Timken bearings in this critical application. You'll find Timken bearings throughout the "vital zone"—in differentials and transmissions, steering gears and wheels—wherever value counts most.

ONLY TIMKEN BEARINGS GIVE YOU ALL THESE VALUE FEATURES

QUALITY

1. Design leadership
2. Steel made in our own mill
3. Precision manufacture
4. Rigid quality control
5. More than 50 years' experience

SERVICE

6. Unequalled engineering service
7. Unequalled research and development facilities for your use
8. Installation service in the field
9. Widest range of sizes
10. Most dependable source of supply

PUBLIC ACCEPTANCE

11. First choice throughout industry
12. Best-known name in bearings
13. Widespread advertising

it's TIMKEN for VALUE

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL ◐ AND THRUST →◐← LOADS OR ANY COMBINATION ✳

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Cummins Engine Co., Inc.—Robert E. Huthsteiner has been elected president.

The Glenn L. Martin Co.—James Allen, special assistant to the administrator of the Reconstruction Finance Corp., has been elected to the board of directors.

Curtiss-Wright Corp. Thomas C. Coyne has been appointed vice president in charge of scheduling, planning and production control.

The White Motor Co.—Walter L. Luli has been named chief engineer of the coach div.

United States Rubber Co.—**Herbert E. Smith,** chairman and chief executive officer, announced his retirement effective Aug. 31. He will continue as a director and a member of the finance committee.

Caterpillar Tractor Co.—**Leonard J. Fletcher** has been elected a vice president.

International Harvester Co. of Great Britain, Ltd.—**Brooks McCormick** has been appointed joint managing director.

Perfect Circle Corp.—At a recent meeting of the board of directors, **W. B. Prosser** was elected vice president.

Borg-Warner Corp. Marvel-Schebler Products Div.—**Robert D. Turner** has been appointed secretary-treasurer, and **Donald N. Arndt,** general sales manager.

The Buda Co.—**L. F. Shoemaker** has been elected vice president.

Pratt & Whitney Aircraft Div., United Aircraft Corp.—**Edward P. Bullard, III,** has been appointed manager of the company's new North Haven, Conn., plant.

Koppers Co., Inc.—The appointment of **Major General R. C. Coupland (USAF ret.)** as manager of a newly-created Product Development Dept. of the Metal Products Div. has been announced.

Chrysler Corp.—**Paul M. Nash** has been appointed chief engineer of the corporation's Highland Park plant, succeeding **Arthur H. Fries,** who recently became works manager of the Highland Park plant.

Ford Motor Co., Lincoln-Mercury Div.—**William C. Ford,** one of the three Ford Brothers, has been appointed manager of the quality control department of the gas turbine plant of the division's defense production operations.

Revere Copper and Brass Inc.—Five new members have been elected to the board of directors—four of them vice-presidents of Revere and the fifth a vice-president of American Smelting and Refining Co. The new directors are: **Simon D. Strauss,** vice-president in charge of sales for American Smelting and Refining Co.; and the four Revere men—**Charles A. Macfie** and **J. Aylmer Doucett** of the New York executive offices; **Irving T. Bennett,** head of the Baltimore Div., Baltimore, Md.; and **James M. Kennedy,** who is in charge of the Rome Manufacturing Co. Div., Rome, N. Y.

The Bendix Aviation Corp.—The appointment of **Donald M. McGrath** as general manager of the company's Utica div., has been announced. **Edward F. Kolar** has been named general manager of the Red Bank div. to succeed Mr. McGrath. **George E. Steiner** has been named general manager of the new Montrose div. He will continue as general manager of the Scintilla Magneto Div.

Sparton Automotive, Div. of the Sparks-Withington Co.—**E. W. Gentz** has been appointed general manager.

General Electric Co.—**D. R. Shoults,** currently the director of engineering for Aro, Inc., St. Louis, Mo., has been appointed director of the company's Aircraft Nuclear Propulsion project for the Air Force and Atomic Energy Commission. **William V. O'Brien,** commercial vice-president, has been named manager of the company's Apparatus Marketing div. **A. T. Chandonnet** has been appointed manager of G-E's Lynn (Mass.) Turbine Div. **William A. Sredenschek** has been named manager of materials and purchasing.

The Carpenter Steel Co.—**George V. Luerssen,** formerly chief metallurgist, was appointed vice president in charge of metallurgy by the board of directors. He succeeds **B. H. DeLong,** who announced his retirement. **Dr. Carl B. Post** succeeds **Mr. Luerssen** as chief metallurgist.

Thermoid Western Co. — **William Peterson** has been elected vice president and general manager.

Necrology

William C. Johnson, 49, executive vice president of Allis-Chalmers Manufacturing Co., died in Milwaukee, Wisc., on July 26.

W. Wallace Kellett, 60, autogiro and helicopter pioneer, founder and president of the Kellett Aircraft Corp., and former president and chairman of the board of the Republic Aviation Corp., died in Philadelphia, Pa., on July 22.

Royal A. Hauer, 66, former vice president and general manager of the bus division of Mack International, died in Oakland, Calif., on July 18.

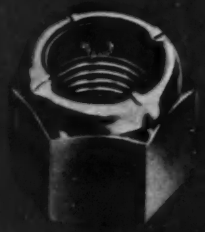
Fred J. Stineman, 41, chief engineer, Douglas Aircraft Co., Long Beach plant, died July 7.

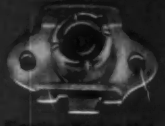
Herman J. Merz, 60, president, Merz Brothers Co., died in Maplewood, N. J., on July 27.

Charles Bradford Cole, 62, president, Tool Equipment Co., Chicago, died in Chicago, Ill., on July 23.

Herbert H. Foster, 47, general purchasing agent, Lincoln-Mercury Div., Ford Motor Co., died in Franklin Hills, Mich., on July 20.

Frank G. Oberle, 44, divisional sales manager, American Bosch Corp., died in Chicago, Ill., on July 16.

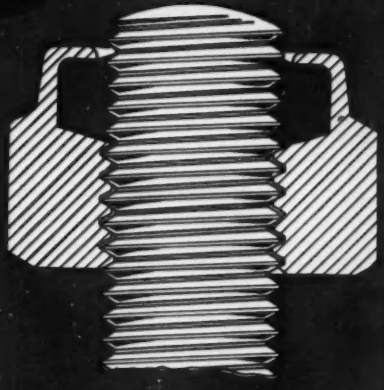




The Famous Red Elastic Collar

NYLON OR FIBER

HOLDS FIRM



APPROVED SELF-LOCKING FASTENERS

FOR ARMY AND NAVY AIRCRAFT, ORDNANCE AND SIGNAL CORPS EQUIPMENT

ESNA

ELASTIC STOP NUTS

Photos courtesy of Universal Winding Company

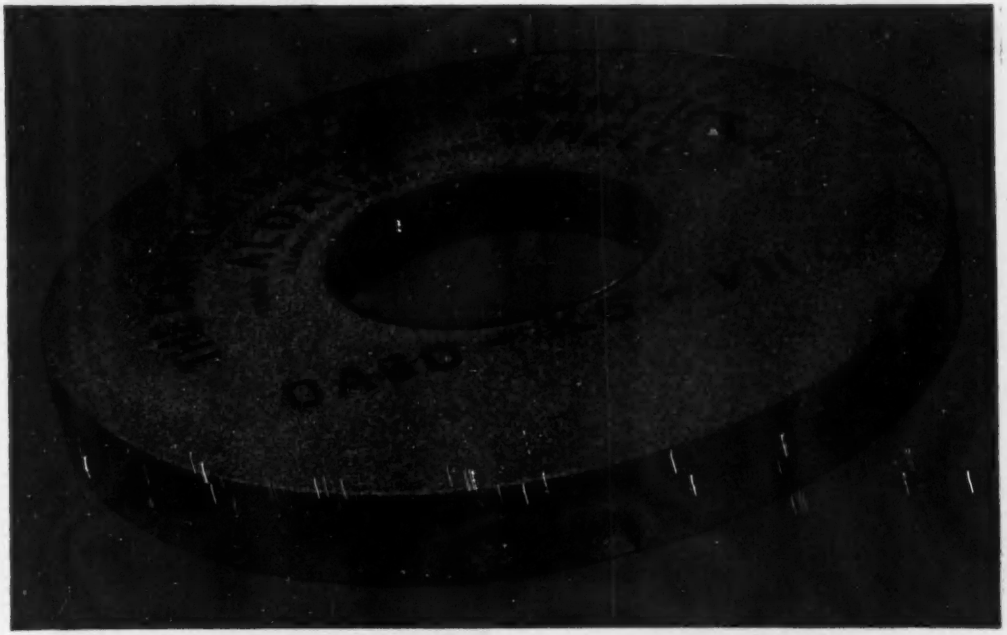
Smooth as silk...to protect nylon

Because delicate nylon must pass over these rolls without danger of damaging rips—the stainless steel surface must be ground to the smoothest of finishes.

Universal Grinding Company reports that V11 Bond grinding wheels are perfect for the job because of excellent form holding qualities at reduced grinding pressures.

Cool, free cutting action produces superior finishes to close tolerances; more rapid stock removal results in high production rate.

Why not investigate the advantages of V11 Bond Wheels by CARBORUNDUM in your cylindrical grinding operations? See your local CARBORUNDUM salesman or distributor—or write Dept. AI 81-27.



Only CARBORUNDUM

TRADE MARK

makes ALL Abrasive Products ...to give you the proper ONE

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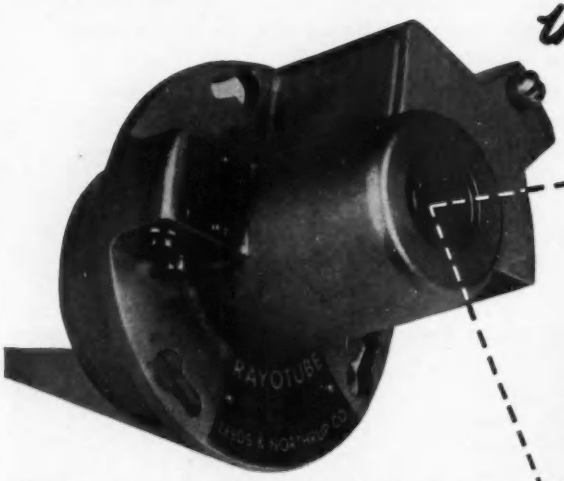
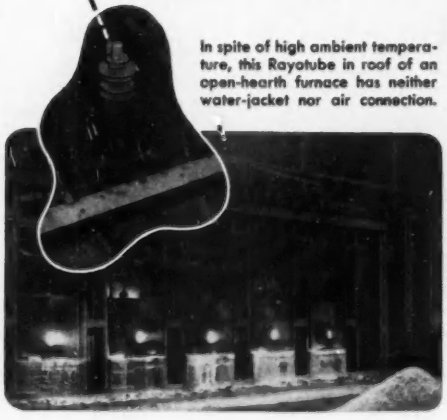
"Carborundum" and "Aloxite" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, N.Y.

Can this new Rayotube mean better control of temperature in your plant?



In Henry Disston & Sons, Inc. plant, Rayotube in slab furnace roof needs no water-jacket against high ambient heat.



In spite of high ambient temperature, this Rayotube in roof of an open-hearth furnace has neither water-jacket nor air connection.

BUILT to detect temperatures for either Speedomax or Micromax Controllers, this new Rayotube No. 8890 has three features which help to improve the accuracy of control action.

1. The water jacket often needed for earlier Rayotubes is seldom required for this one because accuracy is not affected by ambient temperatures unless the head housing itself (shown above) exceeds 350 F. Omitting the jacket greatly simplifies installation and saves both water and maintenance due to water lines.

2. Overheating the Rayotube head to as high as 500 F does no harm; the accuracy decreases above 350, but returns fully as temperature drops. Thus, a few minutes' glare from an open furnace door does not affect the instrument's usefulness.

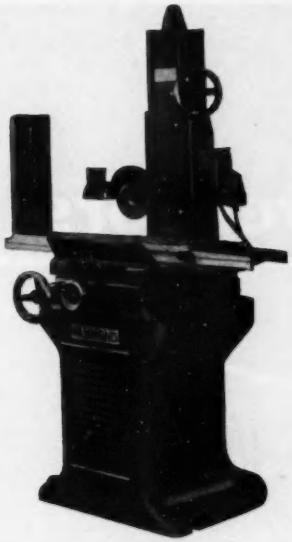
3. New, quick-sighting optical system for aiming the Rayotube at area of important temperature is especially helpful when aiming down an open-end tube to measure directly the surface temperature of parts being heated.

Catalog N-33B describes all Rayotubes as well as Speedomax and Micromax Pyrometers; we also can send description of this Rayotube only. Kindly address either our nearest office, or 4966 Stenton Avenue, Philadelphia 44, Pa.

Jrl Ad NSJ(2)

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

LEEDS & NORTHRUP CO.



A very accurate 6" x 18" Hand Feed Surface Grinder especially adaptable for Tool Room Work and work on small, fussy pieces.

A Unique Radial Drilling Machine with Hinged Bracket that makes it possible to swing quickly from hole to hole over a wide area. A very convenient tapping arrangement is incorporated in this machine.

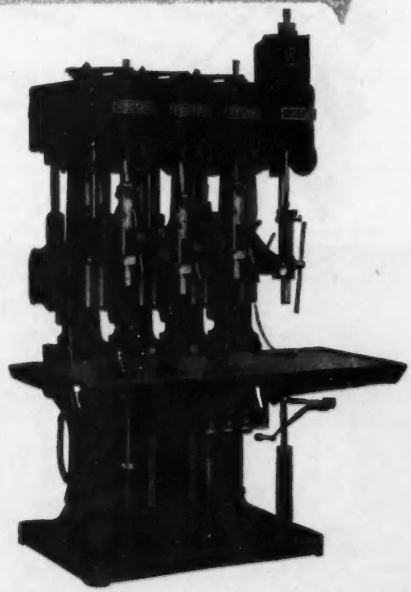
A TIME TESTED LINE OF MACHINE TOOLS

engineered for production

● The choice of fine machine tools is an investment for future profits when products have to be made with increased accuracy and efficiency. ● These machines are built with the usual Footburt workmanship and sturdiness that will keep them accurate over a long period.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

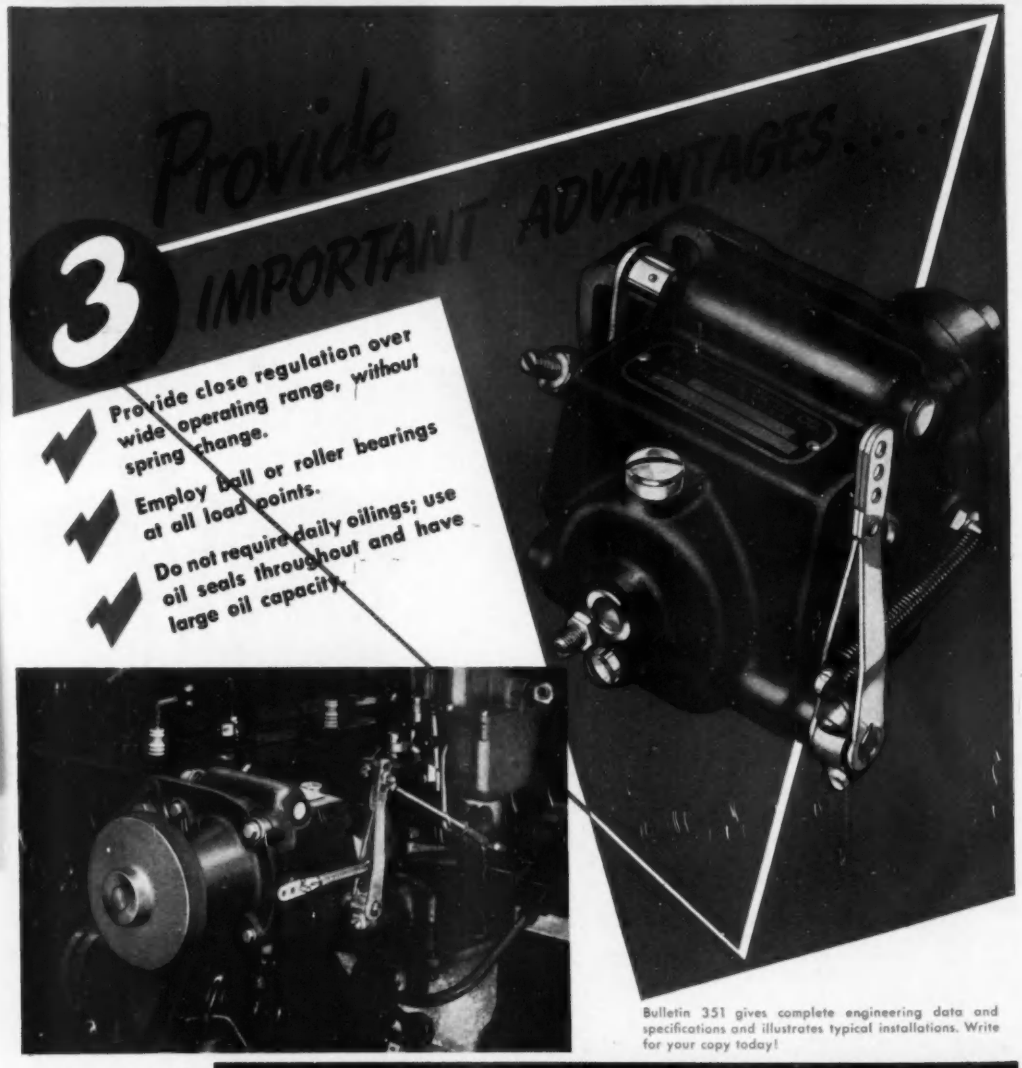
Detroit Office: General Motors Building



Built in 1, 2, 3, 4 and 6 spindle models, also as a tool room drilling machine, these sensitive drilling machines are accurate for the most exacting work and have the usual Footburt sturdiness of construction to make them suitable for continuous production line work. The above 4 spindle machine has tapping attachment and power feed attachment.

FOOTBURT machine tools

HOOF
Mechanical Governors....


Provide
3 IMPORTANT ADVANTAGES....
Provide close regulation over wide operating range, without spring change.
Employ ball or roller bearings at all load points.
Do not require daily oilings; use oil seals throughout and have large oil capacity.

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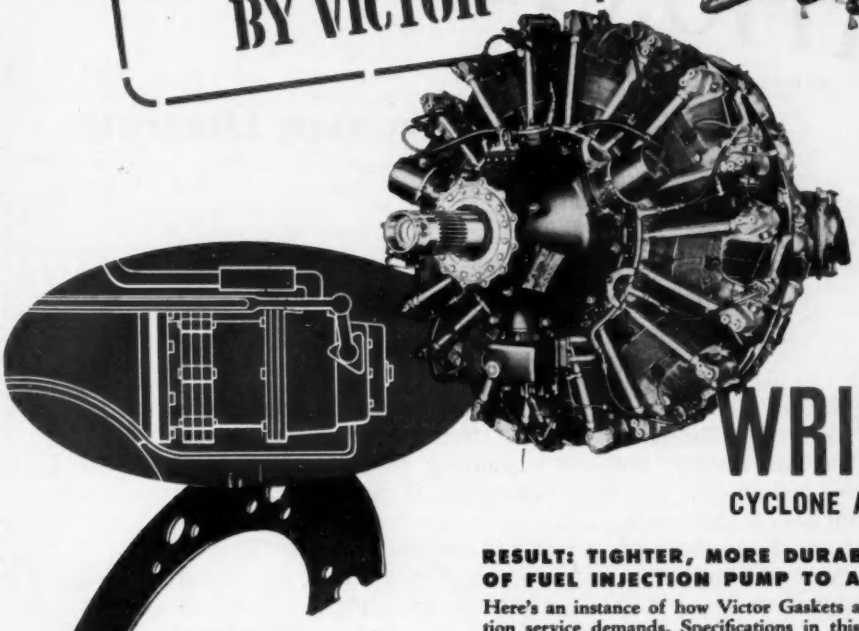

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For this application, Wright Aeronautical engineers found a ready answer in Victor "Sealed to Order" service, resulting in the Copper-VICTOPAC laminated gasket shown at left.

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NATIONALIZATION

—a New Truman Doctrine

An Editorial by
James R. Custer

IN WRITING to the Premier of Iran on the oil crisis there, President Truman last month forged another link in his lethal economic chain of supporting socialistic policies at home and abroad. This time he sounded off in the foreign realm with even bolder words.

It must have been sweet music to the masters in the Kremlin to hear him say ". . . we were happy to see that the British government has on its part accepted the principle of nationalization . . . I had hoped—and still hope—that ways could be found to recognize the principle of nationalization and British interests to the benefit of both."

Then the socialistic British Government joined the chorus as Prime Minister Attlee declared that they had accepted the nationalization of the Iranian oil fields when it "was very strongly pressed upon us by our American friends." Attlee's statement rings with regret and contempt after years of futile struggle to apply this unworkable nationalization system in Great Britain.

To be fair we quote Mr. Truman's reasons—". . . our sympathetic interests in this country in Iran's desire to control its natural resources." State sovereignity is not the basic issue in this international quarrel. It is nationalization, which is definitely anti-American, yet the President approves this economic weapon with which our Soviet enemies aim to destroy us.

Why did he not advocate the free system of competitive enterprise that has made possible America's industrial greatness—the arsenal of the free nations and the envy of the Soviet politburo? Perhaps his radical departure from American tradition is another trial balloon of the pink social planners in Washington.

For the President of the United States to endorse nationaliza-

(*Turn to page* 134, *please*)

Facts That Refute Alleged Concentration of Defense Contracts

IN the words of the Senate Select Committee on Small Business, to check their suspicions that there is a concentration of defense contracts among a select few manufacturers, they made an independent survey. However, with these preconceived notions, the result was a natural one—a prejudiced report that did not give all the facts and omitted the most vital ones at that. No mention was made of the important role that many thousands of subcontractors and suppliers have in the defense manufacturing setup of the automotive and aviation industries.

Those with industrial experience know that in most instances only large manufacturers are equipped with organizations and production know-how to handle multi-million dollar military contracts, particularly in an emergency such as developed after the Korean War began. Subcontracting is an integral and essential part of their mass production systems. A survey by AUTOMOTIVE INDUSTRIES reveals that this principle is generally accepted in industry and also that defense work should be spread as much as possible by subcontracting in the interest of a sound national economy. How fast subcontracting can be applied depends upon the availability of qualified manufacturers and numer-

(*Turn to page* 86, *please*)

Aircraft Subcontracting

THE report of the Senate Small Business Committee on July 18 brought a reply two days later from the Aircraft Industries Association. In a letter to the committee Dewitt Ramsey (Admiral, USN, Ret.), who is president of the association, emphasized the importance of contractors and suppliers to the aircraft industry, which he said had 60,851 subcontractors in May and that since then the number has increased. Roy T. Hurley, president of the Curtiss-Wright Corp., stated on July 25 that its defense contracts for aircraft engines and propellers totaled over $1 billion on that date with 60 per cent of this manufacturing program being subcontracted to smaller companies. Admiral Ramsey's letter to the Senate committee follows:

Dear Senator Sparkman:

We examined today your report of July 18, entitled "Concentration of Defense Contracts in Industry." In this report your committee lists 50 firms which are reported to "command almost two-thirds of the dollar volume of defense contracts." This, in the opinion expressed by your committee, is inequitable and creates an imbalance.

(*Turn to page* 70, *please*)

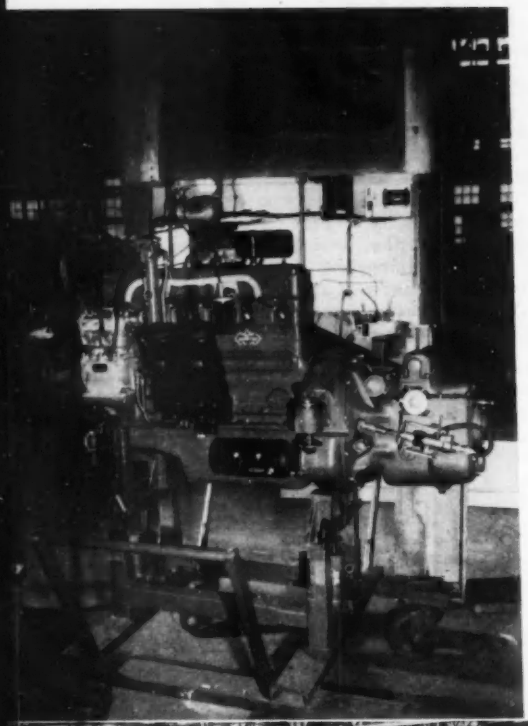
Dollar Volume of Defense Contracts

First 50 Companies by Dollar Volume as Tabulated by Senate Small Business Committee, Including Defense Prime Contracts and Letters of Intent, July 1, 1950—June 1, 1951.

1. General Motors Corp.	$3,500,000,000	26. Firestone Tire and Rubber Co.	142,041,000
2. Ford Motor Co.	1,000,000,000	27. Fairchild Engine & Airplane Corp.	127,154,000
3. Boeing Airplane Co.	960,000,000	28. Bethlehem Steel Co.	127,056,000
4. Curtiss-Wright Corp.	840,240,000	29. Bell Aircraft Corp.	125,092,000
5. Lockheed Aircraft Corp.	674,300,000	30. Food Machinery & Chemical Corp.	125,000,000
6. Republic Aviation Corp.	549,040,000	31. Willys-Overland Motors, Inc.	124,350,000
7. General Electric Co.	500,000,000	32. Avco	122,000,000
8. United Aircraft Corp.	490,000,000	33. Newport News Shipbuilding Co.	120,400,000
9. North American Aviation	481,897,000	34. Northrop Aircraft, Inc.	119,144,000
10. Bendix Aviation Corp.	475,000,000	35. Glenn L. Martin Co.	108,900,000
11. Grumann Aircraft Engineering Corp.	410,000,000	36. Radio Corp. of America	108,560,000
12. International Harvester Co.	355,000,000	37. Goodyear Tire & Rubber Co.	108,000,000
13. Western Electric	343,000,000	38. American Car & Foundry Co.	105,000,000
14. McDonnell	269,000,000	39. Raytheon Manufacturing Co.	103,500,000
15. Westinghouse Electric and Mfg. Co.	245,000,000	40. Studebaker Corp.	97,845,000
16. American Locomotive Co.	229,000,000	41. Beech Aircraft Corp.	86,000,000
17. Chrysler Corp.	223,417,000	42. Standard Oil of New Jersey Affiliates	82,000,000
18. American Woolen Co., Inc.	208,284,000	43. Emerson Electric Manufacturing Co.	75,000,000
19. Allis-Chalmers Manufacturing Co.	200,000,000	44. Kaiser-Frazer	65,550,000
20. Packard Motor Car Co.	199,500,000	45. Caterpillar Tractor Co.	65,000,000
21. Sperry Corp.	198,000,000	46. Baldwin Lima Hamilton Corp.	65,000,000
22. Nash-Kelvinator Corp.	192,000,000	47. United States Rubber Co.	64,000,000
23. Douglas Aircraft Co., Inc.	172,129,000	48. Diamond Motor Car Co.	55,000,000
24. Consolidated Vultee Aircraft Co., Inc.	153,500,000	49. United States Steel	55,000,000
25. J. P. Stevens & Co., Inc.	151,900,000	50. Eastman Kodak Co.	44,694,000

Building a Bus per

The ACF-Brill Motors Co. is Turning Out 200 Buses Monthly in a Newly-Equipped Plant that Features a Unique Assembly Line Setup. Operations are Arranged for Completion Within an Hour at Each Work Station, Even Though Some Parts Had to be Modified to Meet the Schedule.



IN the light of a new ideology which has taken place at ACF-Brill Motors Co., Philadelphia, Pa., the firm has been quietly revitalizing its production facilities. Designed for civilian and military transportation equipment, these new facilities are turning out about 200 buses monthly on a one shift basis.

One of the most striking developments in the new setup is the installation of a moving three-sectioned assembly line for the buses. Unlike a continuously moving conveyor, this line moves only once each hour and movement is equal to the distance between work stations.

So that certain operations could be performed in the course of an hour, there had to be skillful coordination of materials and tooling for economic assembly. To hold within the time limit for assembling some portions of the vehicle, the engineering department had to modify certain parts to adhere to the simplified production setup prescribed by the manufacturing department.

The complete assembly line, progressing from the initial sub-assembly to the completed unit, is divided into 64 stations. Eight of these stations are concerned with the construction of the roof, sides, and underframe sub-assemblies.

Of the 56 stations on the final line, stations three through 14 are probably the most unique. This section of the Brill-modernized setup consists of 12 dollies or rolling platforms resting on a set of tracks and connected to each other by a detachable bar. Power to move the assembly line is supplied by a winch at station number 14.

(Top) Positioning the engine in the rear of the bus is done by one man with the special Brill-made fixture shown holding the power plant.

(Left) This view shows the first section of the new conveyorized assembly line that has been designed for mass bus production. Note the dollies or rolling platforms — mounted on tracks.

Hour

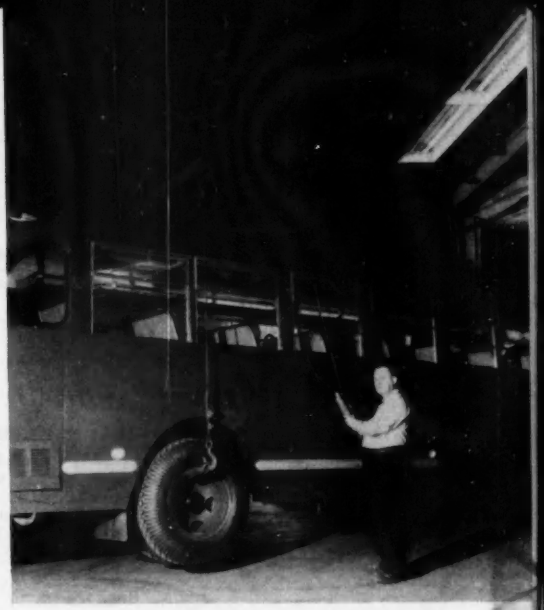
By Thomas Mac New

The dollies, which move transversely along the assembly line, are large enough to hold any bus of legal length and width. One minute before the hour alloted for operations at each station a whistle is sounded to prepare the workers for a line move. Movement is controlled by an automatic limit switch. At each station along this line, three to six operations are performed on each bus.

No units need be installed on the underside of the bus once it is on the conveyorized section of the final line, since underframe parts are completely assembled at stations one and two. Operations at these stations consist of welding, installing control rods and other equipment such as the gas tank, underfloor cable and horns. The front and rear axles are positioned and the underframe is mounted on them.

The underframe assembly is then picked up by an overhead crane and placed on the first platform at station three. At this point the body sides are hung and hot riveted, and the roof is positioned and fastened. Going along the line progressive sheet metal, plumbing and electrical work is done up to station 13 where the vehicle receives its engine—mounted transversely in the rear. At present only rear engined jobs are going through the line.

Brills constructed a special cradle and dolly so that the engine can be properly positioned in the rear of the bus by one man. After the worker positions the engine, it is secured to the bus mounting brackets and certain connections are made. The cradle is then lowered on the dolly through the use of two hydraulic jacks. When the fixture is moved away from the installation, the cradle is again raised to the proper height to receive another engine. The vehicle then proceeds to the last station.

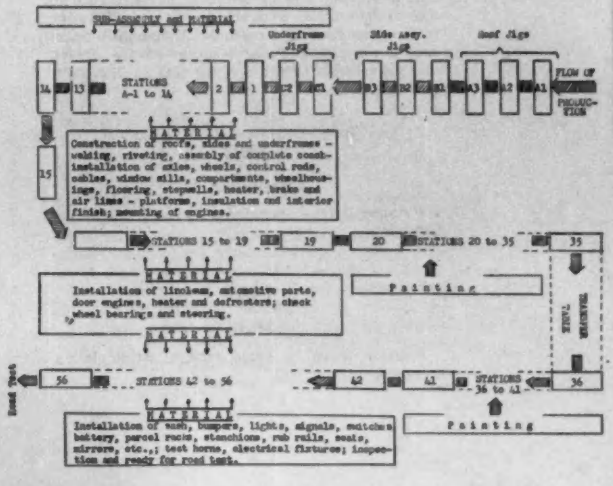


An overhead hoist—traveling on a curved track—is used to lift the rear end of the buses to turn them around a tight corner between two assembly areas.

After assembly operations are completed at the last station, number 14, the bus is rolled down a ramp at the rear of the conveyor platform—five minutes before the one-minute warning whistle—into an adjoining building. The rear end of the bus is lifted by an

(*Turn to page* 88, *please*)

PRODUCTION LINE SET-UP


SUB-ASSEMBLY and MATERIAL
Underframe Jigs
Side Assy. Jigs
Roof Jigs
STATIONS A-1 to 14
FLOW OF PRODUCTION
MATERIAL
Construction of roofs, sides and underframes - welding, riveting, assembly of complete comb- installation of axles, wheels, control rods, cables, window sills, compartments, wheelhousings, flooring, stepwells, heater, brake and air lines - platforms, insulation and interior finish; mounting of engines.
STATIONS 15 to 19
STATIONS 20 to 35
MATERIAL
Installation of linoleum, automotive parts, door engines, heater and defrosters; check wheel bearings and steering.
Painting
TRANSFER TABLE
MATERIAL
STATIONS 42 to 56
STATIONS 36 to 41
Road Test
Installation of seats, bumpers, lights, signals, switches, battery, parcel racks, stanchions, rub rails, seats, mirrors, etc.,; test horns, electrical fixtures; inspection and ready for road test.
Painting

The new conveyorized assembly line flows through two buildings and consists of 56 work stations. Eight other stations are devoted to sub-assembly operations.

Chronological History of Automatic

1904

Sturtevant Transmission

Unit used a centrifugally-operated automatic clutch, an overrunning clutch, and a two-speed transmission. Device was controlled by car speed. Manufactured by Sturtevant Brothers, it was installed in their production automobile.

Barber

Hydraulic operation of a variable gear which dispensed with clutch and differential. This unit was installed on Simplex cars in England.

1905

Föttinger Torque Converter

The hydro-kinetic torque converter was invented by Dr. Herrmann Föttinger in Germany. His units were first used in ships—1908, automobiles—1912, rail-cars and locomotives—1924. The Vulcan Ship Yards, Hamburg, Germany, produced the single-stage, single-phase unit.

1906

Lambert

This transmission was a friction drive that had a driving and driven disk arranged at 90 deg to each other with the rim of one disk contacting the face of the other. A manually-operated lever changed the position of the driven disk in relation to the driving disk to provide a variable ratio.

1907

Cartercar

Friction drive—operated on same principle as Lambert.

1909

Metz

Friction drive — same general principle as Lambert.

1912

Bauer Hydraulic Coupling

Dr. Bauer of the Vulcan Ship Yard, Germany, designed and built the first fluid coupling. It was similar to the Föttinger torque converter without reaction vanes. This unit was built primarily to dampen torsional vibrations set up in early Diesel engines.

Hele-Shaw Transmission

This device, manufactured and used for English vehicles, was a hydrostatic type transmission that used a hydraulic pump and motor. Ratio was controlled by varying pump delivery.

1915

Entz

Developed by Justus B. Entz, it was an electric differential transmission composed of an electric generator and motor with a planetary reverse gear installed on the output shaft. The Owen Magnetic car was equipped with the unit.

1916

Haynes and Norwalk

Solenoid magnets were used to shift gears in a sliding gear transmission. It was used on the Premier automobile by the Premier Motor Corp.

1919

Cotal

Employed a p-anetary transmission with magnetic clutches operated by current from battery. Produced by Cotal of France, it was used on some European vehicles.

1925

Delavaud Drive

This was a variable throw type that used a

Transmission Developments

Presented here are brief descriptions, together with applications, of semi- and fully-automatic transmissions that have been produced or scheduled for production since 1904.

series of roller ratchets on the rear axle. These were actuated by connecting rods extending from a wabbleplate, and therefore the stroke of the connecting rods was automatically variable according to the torque load on the rear axle. It was used on foreign cars.

1926

Fluid Flywheel

A fluid coupling was used in conjunction with a conventional transmission and clutch. Developed by Harold Sinclair, it was produced by Daimler Motor Co. and used by the Associated Equipment Co. for English buses. This was probably the first successful use in a road vehicle.

1927

Constantinesco

Known as the mass-inertia drive, a connecting rod from the engine's crankshaft was used to oscillate velocity to a hinged weight. It made use of the hinge point reaction to the acceleration of the weight. Ratchets were used to alternately connect the hinge reaction. This transmission was installed in a small French production car.

1928

Lysholm-Smith Torque Converter

Produced by the Ljungstrom Steam Turbine Co. of Sweden, it was a three-stage, single-phase, hydro-kinetic torque converter with a direct drive clutch. Leyland Motors, Ltd., England, was the first firm to use it for production road vehicles—buses in 1933.

1930

Spontan Transmission

This was a mass-inertia drive similar to the Constantinesco of 1927. Although the unit was manufactured in Sweden, it was installed in an Essex car for U. S. demonstration.

1934

Trilok

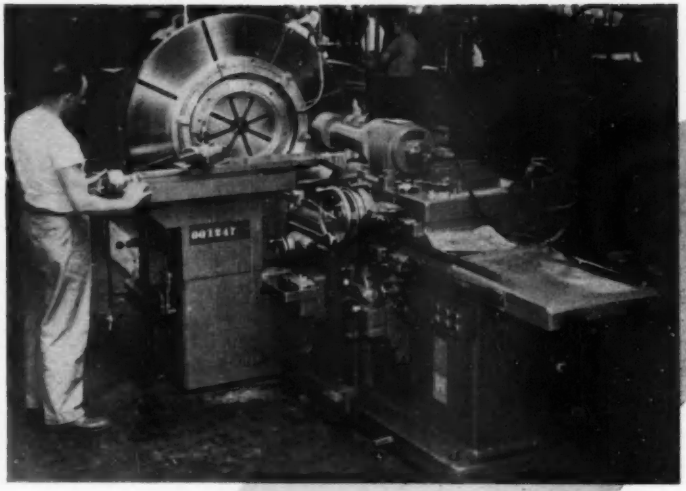
A hydraulic torque converter of the single-stage, two-phase type was made by Klein, Schanzlin & Becker Co., Germany. The unit, which acted as a fluid coupling at high speeds, was used in railcars and automobiles.

Warner Automatic Overdrive

This device, which is still being utilized, is a two-speed planetary automatic transmission in conjunction with a conventional transmission. At first a Keller clutch was used and the overdrive unit was controlled by car speed only. Later models used a solenoid which operated a pawl that was adapted to hold one of the members of the planetary unit from rotation. The device was then controlled by car speed and the accelerator pedal. It is produced by the Warner Gear Div. of Borg-Warner Corp. for a number of production automobiles.

(*Turn to page 74, please*)

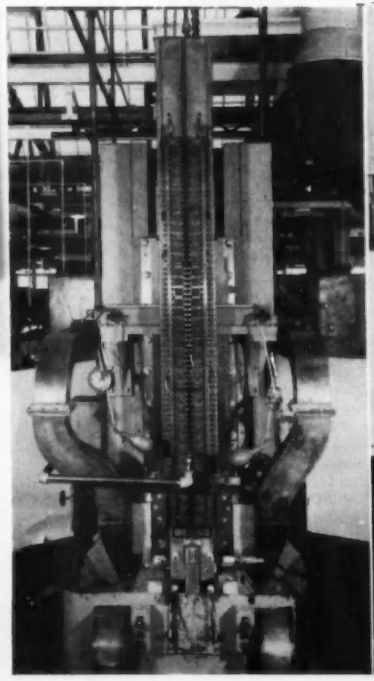
Advanced Jet



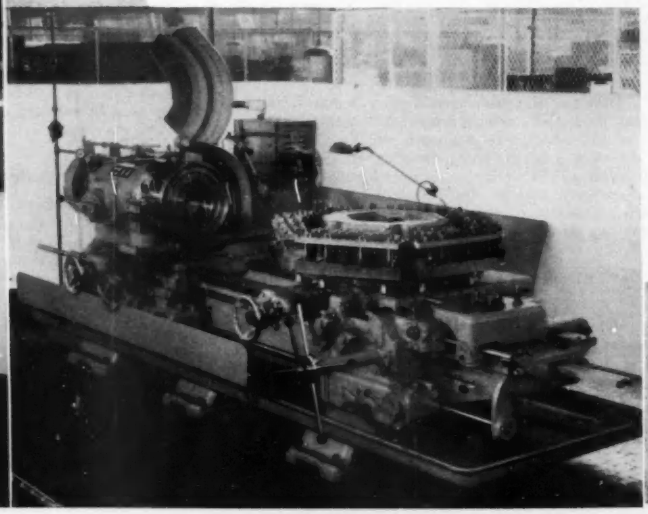
Mounting the cross slide from a Monarch engine lathe on a Heald No. 174 internal grinder permits grinding and turning in a single setup.

THE NEW designs of axial-flow gas-turbine engines of extremely high power, recently developed by Pratt & Whitney Aircraft Division of United Aircraft Corp., East Hartford, Conn., posed production problems which had not been encountered during P&WA's 25-year metalworking history in building piston engines and the relatively more simple centrifugal-type turbojets which P&WA has been turning out since 1948. These new requirements

Both sides of the fir tree roots of turbine blades are broached at one pass in this Lapointe 15-ton, 90-in. vertical broach.



Extra support for tools as they cut is provided by a hardened steel plate which spans the gap in the carriage of the J & L turret lathe shown here. Hardened steel bolts that project from the lower part of the toolholders ride on the steel plate, thus eliminating the effect of overhang of the large, six-way turret.



Methods for Machining Engine Parts

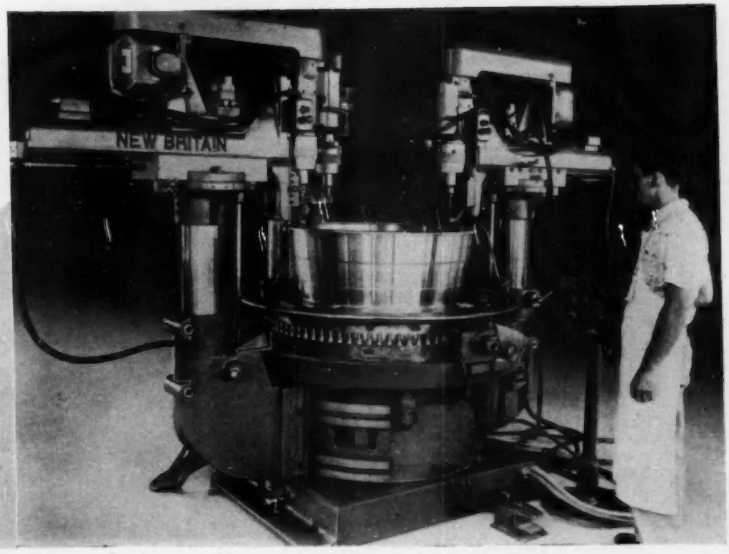
were the beginning of an intensive search for more efficient machining methods directed by Arthur A. Merry, P&WA chief tool engineer, under the supervision of John L. Bunce, P&WA factory manager at East Hartford.

New tooling methods and new machines were necessary to cope with these problems, which arose primarily from the need to work with a number of new and much tougher materials, and to produce a wide range of components of large diameter and thin wall section. Moreover, the rate of production asked for by the U. S. Air Force and Navy made obsolete many production methods that had formerly been acceptable for the peacetime rate of output.

The new machines and methods worked out by Pratt & Whitney Aircraft are aimed at speeding up production through combining operations, increasing worker-efficiency, and improving the quality of the finished parts. Moreover, the machines possess a high degree of flexibility in utilization—a feature which is highly desirable on two counts: (1) in view of the wide variety of sizes and shapes of the parts to be produced on these machines, and (2) in view of the rapidly changing picture of gas turbine development.

Machining thin-walled stainless steel rings of very large diameter for turbojet nozzle vane rings, blade shrouds, and tailpipes, posed a difficult problem.

The diameters to be handled—running up to 48 in.—required a large lathe, capable of a 60-in. swing, a size which is normally built only for heavy duty work. But the jet engine rings are shallow and of thin wall-section and the cuts to be made are relatively light and precise, and so the large capacity of the conventional heavy duty lathe was not actually needed. What was really wanted was the range of a large car-wheel lathe with the



This three-head, adjustable spindle, circular type drilling machine can drill, ream and countersink, counterbore, or tap at one setup.

Machining Jet Engine Parts *(contd)*

sensitivity which is inherent in a tool-room lathe.

These requirements, together with a suggestion for a new lathe layout, were taken to Lodge & Shipley, whose designers carried the idea onward. The result was an entirely new lathe design; a right-angle chucking lathe with a T-shaped bed, that is, the section of the bed on which the carriage is mounted is at right angles to the center line of the spindle. The carriage carries a cross-slide which can move either parallel to the spindle center line or at any angle to it. Hence, the new lathe can handle facing, straight or taper turning or boring, and can be purchased with a contouring attachment.

Five of these new T-bed lathes have already been installed at P&WA, and Lodge & Shipley is now supplying them to other industries.

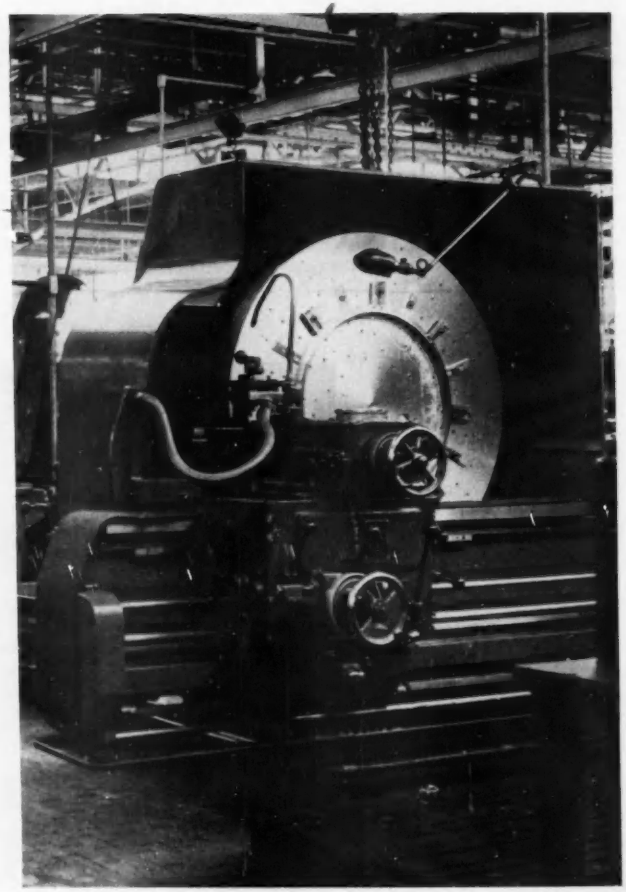
The new Lodge & Shipley lathe uses a standard 25-in. heavy-duty headstock with an 11½ in. hole. This permits chucking pieces with a shaft or other extension. The bulk of the parts to be made, however, are simply clamped to the large faceplate—a 54-in. diameter aluminum casting, five in. thick. The work is held to this faceplate by means of mild steel straps and rods, located in ⅜ in. holes drilled in the plate, or by chuck jaws bolted to the aluminum plate.

Highly sensitive controls on the new lathes permit tolerances of 0.001 in. to be held. All operations are controlled from the apron, including selection from 25 spindle speeds ranging from four to 225 rpm, and from 55 feed speeds for the carriage and compound rest (from 0.001 to 0.0064 ipr).

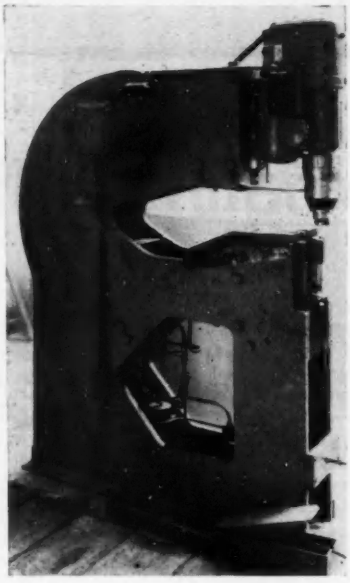
It is easier to load and unload the new lathe than standard lathes, since there is not the usual long bed extending beyond the workpiece. Furthermore, the operator can stand much closer to the work, making it easier for him to follow the progress of the cutting and to make precise measurements of the work as it progresses. Obviously, the new design saves nearly half the floor space that would have been required by a standard 60-in. swing lathe.

Pratt & Whitney Aircraft's axial-flow gas turbine designs are assembled from a number of circular elements, bolted together. Because of this, it is necessary to execute a large variety of drilling patterns, spread over diameters ranging up to 48 in., and in some cases providing as many as 196 holes.

The volume of production did not warrant the outlay for multi-spindle drilling machines, capable of handling the whole range of patterns. Even if it had, a multi-spindle machine would not have been practical because of the time that would be lost changing drills. Most of these engine components are made in stainless steel, and the number of holes drilled between sharpenings is very low, in stainless, as compared with low carbon steel. Furthermore there was no standard milling machine (*Turn to page 67, please*)



Lodge & Shipley right-angle chucking lathe with T-shaped bed. This machine can handle facing, straight or taper turning or boring, and can be fitted with a contouring attachment.



The special machine, shown here, utilized for cold spin dimpling can take a wide range of materials and can make up to 25 dimples per minute.

Cold Spin-Dimpling Process for Light Alloy Sheets

AFTER about three years of experimental work, the Bristol Aeroplane Co., Bristol, England, is making regular use of a cold spin-dimpling process for high strength light alloy sheets.

The work is performed by a specially designed machine that incorporates a 120-deg two-blade Stellite-tipped spinning bit rotating at 250 to 385 rpm, depending on the thickness of the material. Pressure is applied to the tool whereby the material is coined into a stationary die. Diameter of the dimple can be maintained to a tolerance of plus or minus 0.002 in., with production runs of at least 20,000 holes without attention to the tool or setting.

The spinning bit is rotated by an electric motor and pressure is applied through an automatically controlled system utilizing compressed air.

A wide range of materials can be dimpled by this process to accommodate 3/32 to 3/16 in. diam rivets. Production runs of from 10 to 25 dimples per minute can be maintained from pre-drilled holes, according to the malleability of the material.

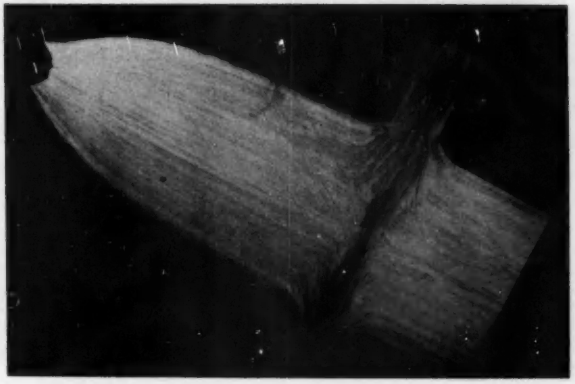
• • •

New Cold Welding Techniques

SEVERAL new application techniques of Koldwelding have been developed recently. Koldwelding is a method of welding non-ferrous metals without the use of heat or electricity, by cold pressure alone. It was originally developed in England by General Electric Co., Ltd., and is being used there by a number of fabricators. It was introduced to American industry last year by Koldweld Corp., New York City. A description of the process appeared in AUTOMOTIVE INDUSTRIES December 15, 1950.

One new development is a method for cold butt-welding of rods and wires, such as aluminum-to-aluminum, aluminum-to-copper, and copper-to-copper, without the application of heat or electricity. The tools required for producing the butt-weld are said to be extremely simple, and the efficiency of the butt-weld has proved in tests to be the greatest yet obtained with the Koldweld pressure method. Butt-welding of

(*Turn to page* 122, *please*)



Photomicrograph of a butt weld, showing molecular interpenetration. When tested, tensile failure occurred in the parent metal, as seen at left.

Cab-in-white line for the heavy duty Bedford trucks moves on a power driven conveyor to feed the trim line which delivers cabs to the chassis assembly line.

Vauxhall Plant

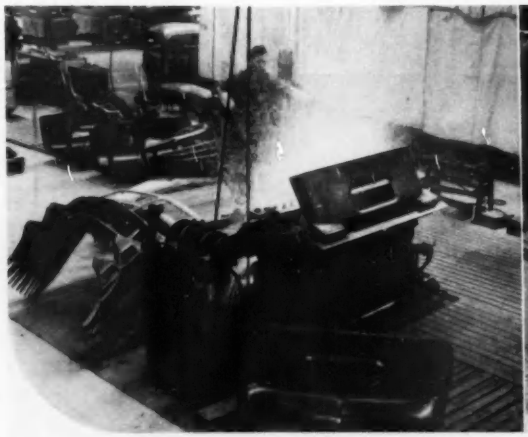
VAUXHALL, the General Motors operation at Luton, England, is completing its preparations for the launching of a new car model within a few months, and for an anticipated daily vehicle output of 1000 units in 1952. It presents a scene quite comparable to plants around Detroit. General Motors provides a ready exchange of information on engineering and manufacturing; also many of the key men in the factory organization are fresh from the USA.

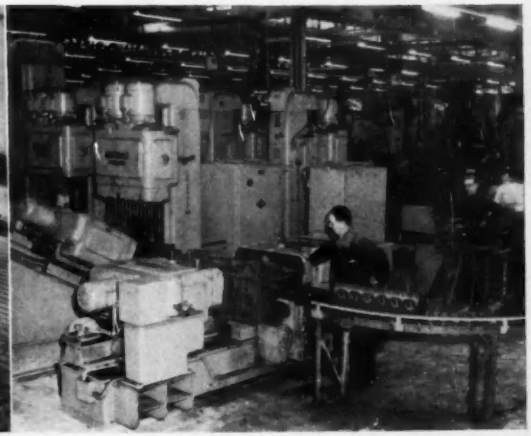
Here are found examples of familiar makes of production equipment—Cincinnati, Foote-Burt, W. F. & John Barnes, Gisholt, Oilgear, Micromatic Hone, Rehnberg-Jacobson, National Acme-Gridley, Conomatic, Sciaky welders, and others. They have a number of small transfer machines, employ surface broaching on some jobs, and operate an extensive gear cutting department featuring Fellows gear shapers, Barber-Colman hobbers, Gleasons, and other equipment. Gear shaving is practiced extensively, using the familiar Red Ring gear finishers built by Churchill in England.

Induction hardening also is coming into its own in Europe. Vauxhall has a small unit built by Philips,

Big Bedford cab assemblies are integrated by flash-welding in the massive framing fixture seen here. (Left)

Vauxhall employs a considerable number of integrated transfer machine lines for various major parts. The one shown here — produced by Archdale of England — handles a variety of drilling operations on cylinder heads. (Below)





Tools Up for New Model

By Joseph Geschelin

designed for selective hardening of three segments on the transmission sliding clutch sleeve. Hardening along the width of the segment is done in three successive steps to prevent distortion of the slots.

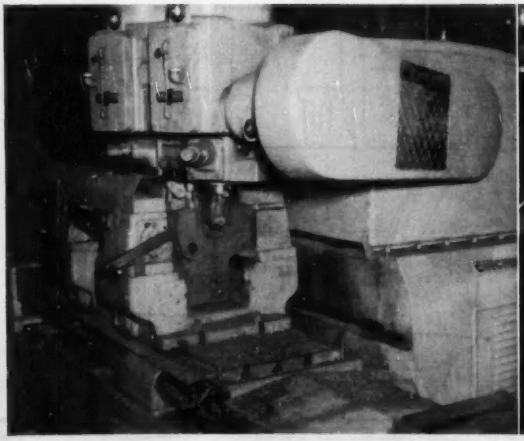
In addition to its current passenger car models and the new model to be launched this fall, Vauxhall builds a complete line of motor trucks—the Bedfords—including heavy duty models. On heavy duty models they use aluminum extensively for the large transmission case, transmission cover, flywheel housing, small covers, and a few other parts. They are in the fortunate position, at least for the time being, of having a plentiful supply of aluminum. The consequent reduction in gross weight makes it possible to operate these vehicles at a speed of 30 mph on the highway whereas conventional vehicles of the same rating are held to a speed of 20 mph by Government regulation.

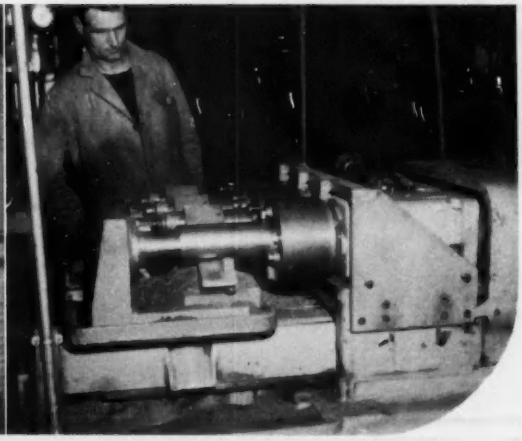
They also build their own engines for cars and trucks, using modern machining methods and assembly line techniques. A noteworthy feature of engine assembly is the provision for automatic "motoring" of partially assembled engines. Although one of the primary objectives of the operation is to set the timing and valve adjustment at a standard speed, it also serves to flush the entire assembly with a flushing oil containing a suitable detergent. Vauxhall has found this to be an invaluable aid in producing clean engines.

Noteworthy too is the extensive layout of materials handling equipment — assembly conveyors, gravity roller sections, special systems designed to meet specific problems, and monorail feeder conveyors for transporting parts and sheet metal to the assembly lines. In this respect Vauxhall's setup compares favorably with materials handling practice in advanced plants in the USA. Materials handling methods at this plant were described in AUTOMOTIVE INDUSTRIES, May 1.

Main bearing locks in the six-cylinder engine block are finished by milling in this Cincinnati vertical mill, using suitably stepped cutters. (Right)

Dry type cylinder sleeves for the S-type six-cylinder engine are machined in the No. 47 Heald Bore-Matic shown here. A three-spindle machine, it handles simultaneously the rough- and semi-finish-boring as well as turning of the OD on three liners at a time. Bores are honed later. (Below)

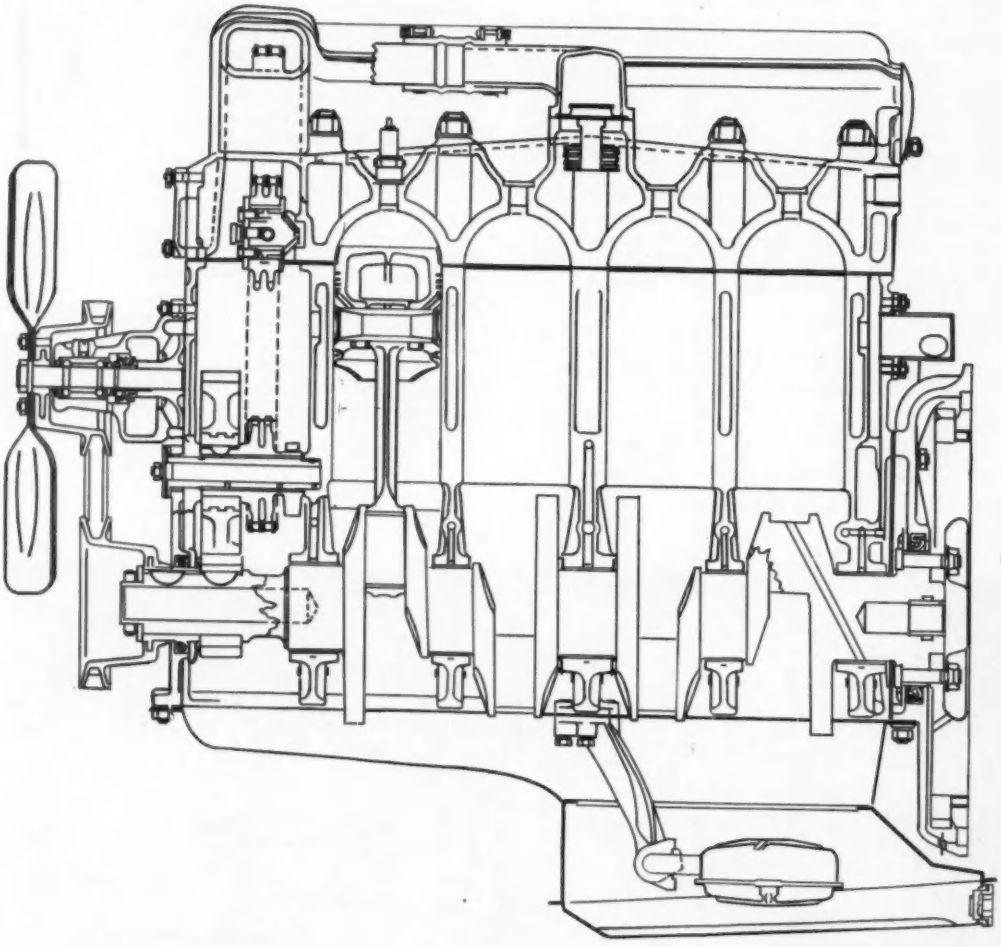




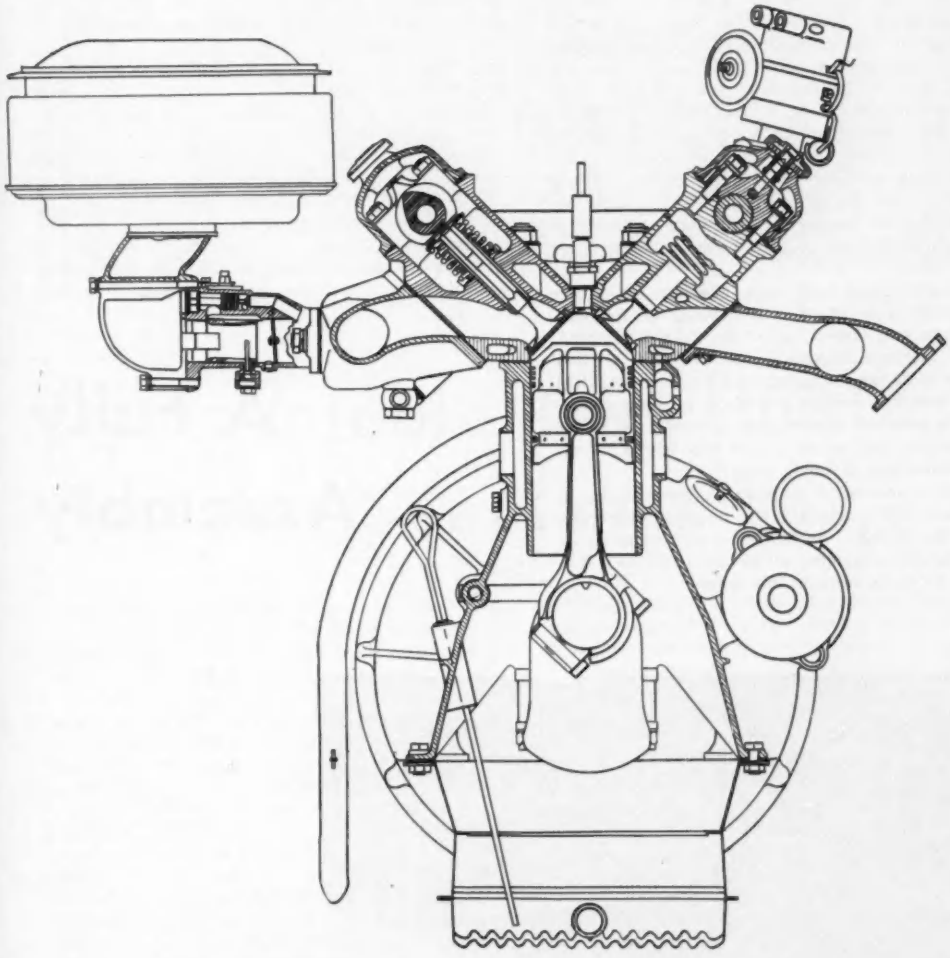
Alfa

SPECIFICATIONS

Number of cylinders	4
Bore and stroke	3.25 by 3.47 in.
Displacement	115 cu in.
Compression ratio	7.5 to 1
Maximum hp	79 at 4800 rpm
Maximum torque	96 lb ft at 3000 rpm
Carburetor	Weber horizontal
Weight	373 lb



Romeo 1900 Engine



A Fully Assembly

By
R. E.
Bechtol

Chief Tool Engineer,
San Diego Div.,
Consolidated Vultee
Aircraft Corp.

ONE of the largest aircraft assembly structures on record is being used at the San Diego, Calif., plant of Consolidated Vultee Aircraft Corp., to speed production of the Convair R3Y-1 turboprop flying boat.

The structure is a twin-hull steel assembly buck, which permits simultaneous, side-by-side construction of two hulls while other major components of the Navy's newest flying weapon are being assembled elsewhere in the factory.

Unlike most previous structures of its kind, the R3Y-1's indoor hull buck is fully demountable. It car be disassembled, moved to another location and reassembled in short order. Another feature is that it can be quickly and easily converted to accommodate design changes, if these are required.

The buck is 165 ft long, 68 ft wide and 26 ft high. Its framework alone weighs approximately 1,000,000 lb, containing 8600 ft of 12-in. pipe and hundreds of lesser size footages.

Three main working levels are provided, with a fourth story for the tail assembly area. Floors for each level are of slip-proof finish. The structure is painted white throughout to give best possible lighting conditions.

Since the twin-hull buck towers almost to the rafters of the building in which it is housed, the factory's regular monorail system cannot be utilized. Instead, separate overhead monorails are provided so that completed hulls can be transported by crane from the buck to beaching cradles, for final assembly operations. The monorail system is an integral part of the buck structure, and serves double duty for both loading and unloading assembly units.

The initial production program for manufacture of the Convair R3Y-1, which is the cargo-transport version of the XP5Y-1 experimental turboprop flying boat, presented a number of tooling problems. The principal problems were in this order:

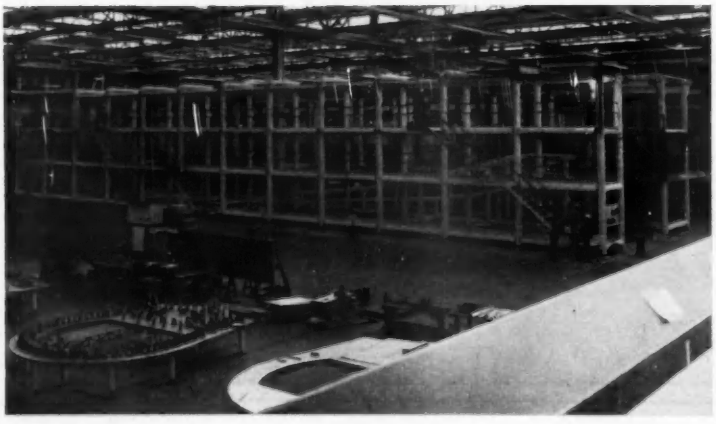
1. The size and complex shape of the R3Y-1 hull required final assembly fixtures of such dimensional magnitude that conventional methods of all-welded construction were considered impractical.

2. Limited height of the roof truss lower cord members in existing plant buildings precluded the use of existing overhead cranes for removal of assemblies from fixtures, and placed other restrictions against normal handling procedures.

3. Possible future need for changes in factory layout, due to expansion of the R3Y and other military contracts, dictated that fixture design should be such that relocation of these tools could be accomplished at minimum expense.

4. Because of the possibility that maximum production effort might be ordered in the event of stepped-up mobilization, the hull assembly fixture had to be designed with provisions for production breakdown of the hull into smaller components, if such action were warranted. Likewise, the fixture had to be easily convertible to allow for incorporation of design changes in the airplane hull structure.

Another tool design problem was the desirability of using the twin-hull buck not only for R3Y cargo-transport versions of the new-type seaplane, but also



General view of the Convair twin-hull assembly buck. It is fully demountable and can be moved to a new location or converted to accomodate design changes if necessary.

Floor-level view of a hull well in the assembly buck. Moving work elevator, directly above man in center of illustration is used at various heights in the wells to place transverse sections of the structure.

Demountable Twin-Hull Buck for Seaplanes

for any tactical categories of the same basic flying boat. In this connection, it should be noted that the XP5Y airplanes were conceived and designed for patrol bombing and other tactical missions.

The entire Siamese unit covers 11,200 sq ft of floor space. The two individual assembly fixtures, placed side by side to form a single twin-hull buck, are so designed that the vertical support members provide the structure for working platforms.

Among the most interesting features in the construction of the basic fixture structure are the prefabricated horizontal and vertical pipe sections. Since these units are standard in size throughout most of the main fixture, welding jigs were provided to prefabricate the units at floor level. This not only simplified the job of welding flanges to the pipe sections, but also maintained jig accuracy for ease of erection and assembly.

This method of jig prefabrication of the vertical and horizontal structure units also provides a means of quick disassembly, in the event that factory rearrangement becomes necessary.

Furthermore, it would greatly expedite any program which requires transferring production activities from the present location to another area of the nation, if ordered by military necessity. The buck can be disassembled into small units for easy handling and shipment by conventional means of transportation.

In terms of increased production, the potential of this type of fixture construction is readily recognized as a means to divide the complete hull assembly into components of smaller size. The unit segments then could be adapted to construct lesser assemblies of any desired configuration, in line with proved mass production techniques.

Future production planning for the giant R3Y and P5Y seaplanes, which gross up to 80 tons, contemplates transverse splices at four stations along the hull length and for skin, stringer and frame sub-assemblies of the surface areas between these splice points.

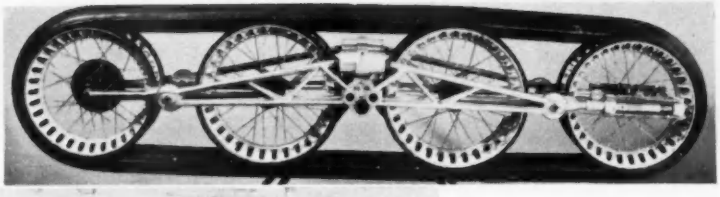
This means that the present twin-hull buck can easily be divided at the various splice points and utilized, with a minimum of alteration, for accelerated production.

Track Type Landing Gear for Light Airplanes

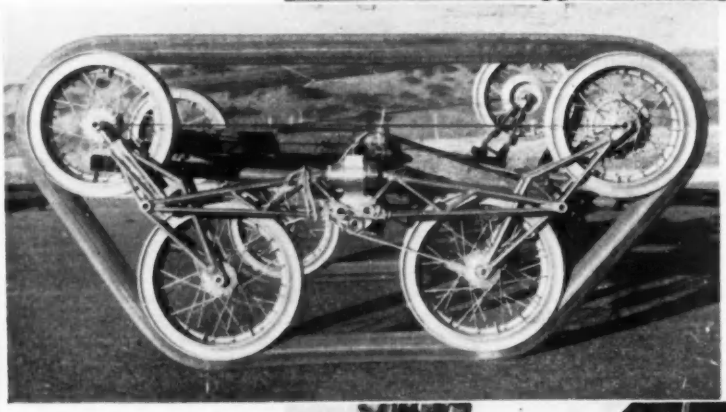
A TRACK type landing gear designed to render an aircraft independent of prepared landing terrain has been developed in Italy by Count G. Bonmartini. Of a pneumatic type track rather than a flat track, it is the Bonmartini tubular track landing gear (BTTG).

This gear was installed on a war-surplus 65-hp Piper Cub for supervised tests conducted by the Italian Aeronautic Bureau. The Bureau reported that the average minimum distance required for the plane to leave the ground is approximately 366 ft, and minimum landing distance is stated to be 186 ft with the new track type equipment.

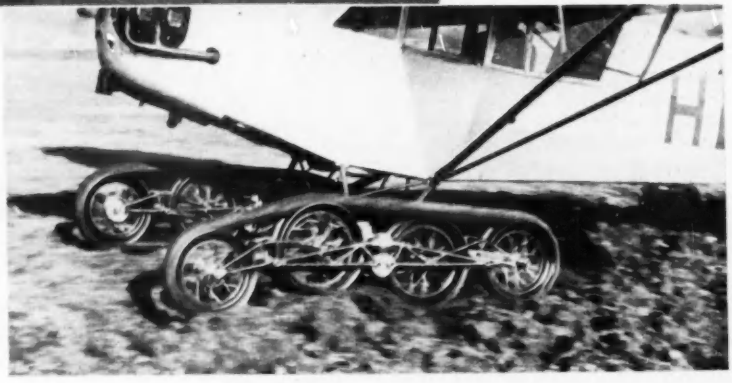
Thus far, the new landing gear is recommended by the maker—Etablissement Sciences Techniques, Rome—for planes weighing up to 2430 lb, but the gear can be produced for larger aircraft.



This Bonmartini tubular track landing gear is the type that was installed on a war-surplus Piper Cub for test.



When in this position, the BTTG can be retracted in the same manner as a wheel type landing gear.

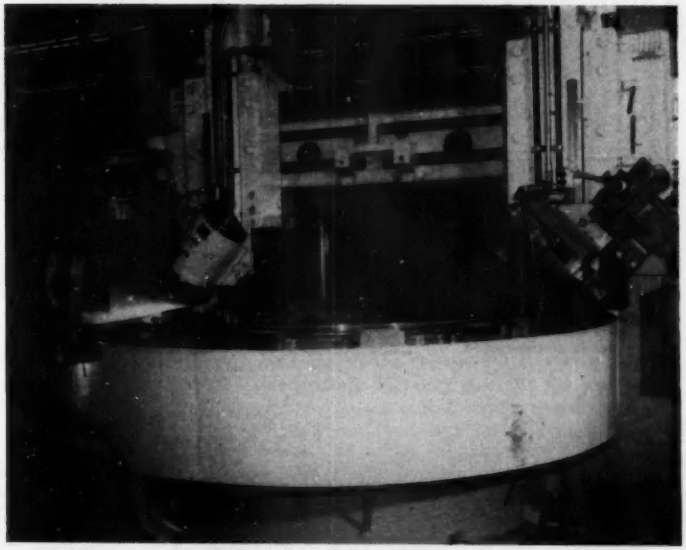


Piper Cub equipped with the BTTG landing on a rough plowed field.

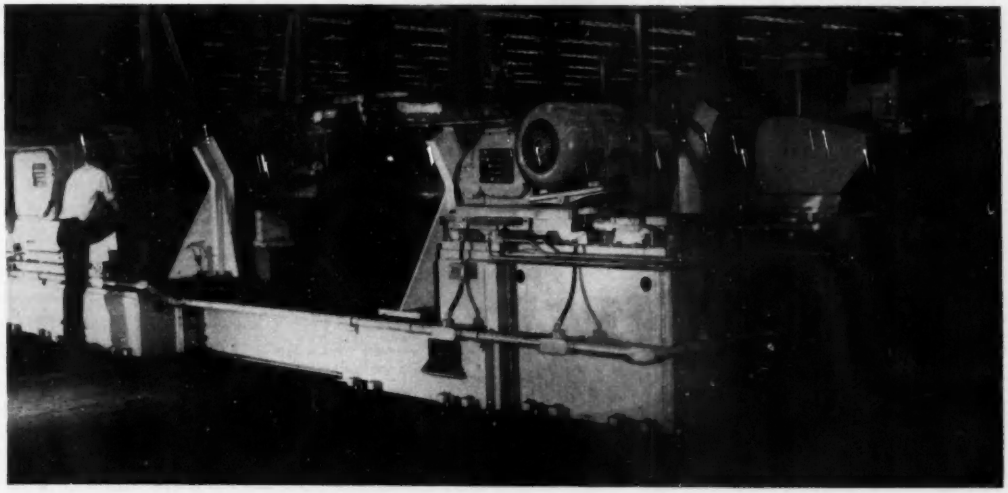
Special Equipment in Cadillac's Tank Plant

Shown here are two large pieces of production equipment employed in the Cleveland Tank Plant, Cadillac Motor Car Div., General Motors Corp. A description of this outstanding plant appeared in the June 1 issue of AUTOMOTIVE INDUSTRIES.

(Right) Grinding of ball races in the turret ring is done in Betts and Niles mills equipped with special grinding heads as shown here. The ring consists of three individual steel forgings, and has a ball center diameter of 78½ in.



(Below) Developed especially for the Cleveland Tank Plant, this big Motch and Merriweather mill has a center fixture large enough to hold a complete tank hull. Large horizontal pad surfaces are milled by milling machines located at each of the four corners.



Le Sabre Features

Condensed Specifications

Basic Dimensions

Wheelbase (in.)	115
Overall length (in.)	200.87
Front tread (in.)	58
Rear tread (in.)	60
Tire size	13-8.00
Overall width at centerline of front axle (in.)	76.75
Overall width at centerline of Rear Axle (in.)	72.50
Overall height with top up (in.)	56

Engine and Chassis

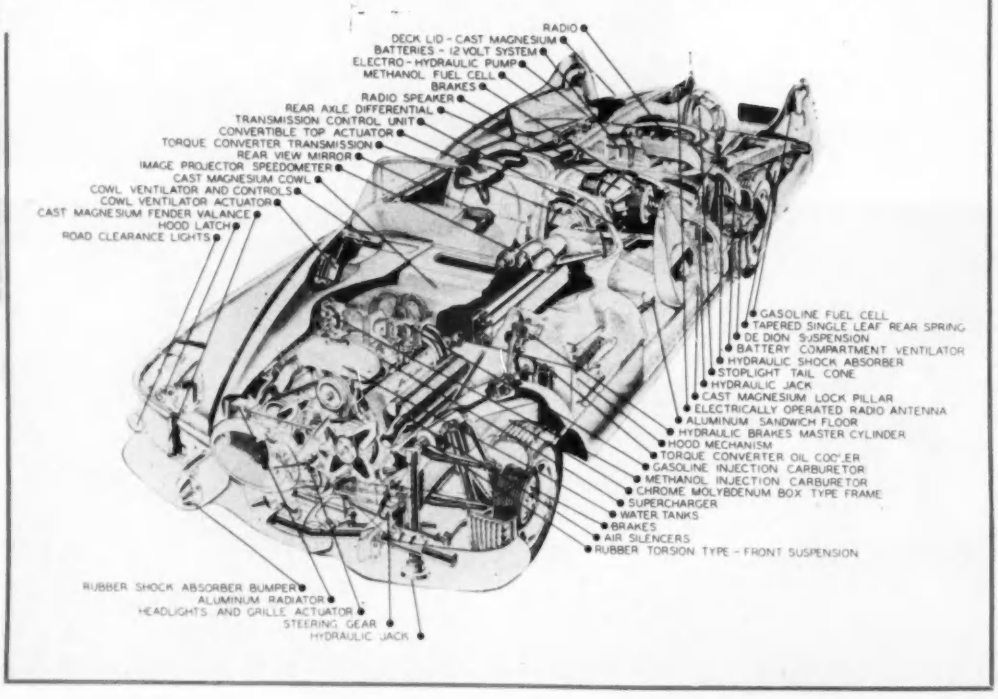
Engine type	90 deg V-8
Engine hp with supercharger	300
Bore and stroke (in.)	3-1/4 x 3-1/8
Piston displacement (cu in.)	215
Compression ratio	10 to 1
Engine block & heads	Cast aluminum
Carburetors	Aircraft pressure type
Electrical system	12 volt
Fuel tank (Premium fuel)	20 gallons
Fuel tank (methanol)	20 gallons
Transmission	Special Dynaflow
Springing front	Rubber torsion type
Springing rear	Single leaf—with DeDion suspension
Jacks	Hydraulic
Frame	Alloy Steel box type

LE SABRE, the experimental car in the form of a super-custom two-seater, developed through the cooperation of General Motors Divisions and expressing many advanced styling and design features stemming from the GM styling section was demonstrated at the GM Proving Grounds recently. It will be recalled that the car was first shown to the press in Detroit in December, 1950, while still in mock-up form. (See AUTOMOTIVE INDUSTRIES Jan. 1, 1951.)

As indicated in the attached mechanical specifications, the power-plant is a radically new V-8 engine with an output of 300 hp, designed and built by Buick, and featuring cast aluminum cylinder block and heads.

Harley Earl went all out in exploiting the use of light metal in body construction. The hood, which also includes the tops of the front fenders, was hand formed from one piece of 0.060-in. aluminum alloy sheet which was then heat treated and aged to give the metal the desired strength and stiffness. The cowl is a one-piece magnesium casting as are the two

Cutaway view of General Motors' new experimental car, showing details of construction.



Light Alloy Construction

deck lids. Rear fenders and skirts are aluminum alloy panels, heat treated and aged in the same manner as the hood. Doors are fabricated of cast magnesium with outside panels of sheet aluminum. In addition, much of the grille work and over-all trim were produced from aluminum alloys. Incidentally, all of the light metal for the many applications of aluminum and magnesium for Le Sabre was provided by the Aluminum Co. of America.

Many devices are controlled by pushbutton in this car. The top is raised and lowered by electric power. Windshield wipers are actuated by pushbutton, and the radio antenna is automatically raised when the radio is turned on. Small headlamps are housed in the small elliptic-shaped grille at the top of the front grille panel. When required, a pushbutton causes the entire grille to rotate and carry the lamps into forward position. Built-in hydraulic jacks at the four corners of the frame are controlled by pushbuttons on the instrument panel.

One of the futuristic features is the mechanism for automatically raising the top when the car is unattended. At the first hint of rain, a single drop of water on the seat cushion has the effect of completing an electrical circuit and causing the top raising mechanism to operate.

No one will estimate the cost of producing the car since it represents an enormous amount of work on the part of many GM car and parts divisions as well as that of the Styling Section. It may be surmised that the cost must be enormous and exemplifies the ability of a large organization to promote forward looking planning in the interest of continued automobile development. Certainly many of the mechanical features and styling as well may be translated into practical production features of cars in the not too distant future.

The premier public showing of Le Sabre in the United States will be at the Michigan State Fair, August 31 to September 9. The car will be on display in the General Motors exhibit throughout the duration of the Fair.

Rolls-Royce Develops Heavy-Duty Diesels

By W. F. Bradley

HEAVY-DUTY Diesel engines, of four and six cylinder varieties, are being developed in England by Rolls-Royce, and will be in production early next year. All models have a bore and stroke of 5⅛ by six in., and practically all wearing parts are interchangeable.

Units will be available either supercharged or normally aspired, they can have light alloy or ferrous castings and wet or dry sump lubrication. Timing

(*Turn to page* 100, *please*)

The BUSINESS PULSE

Plant and Equipment Expenditures Expected to Remain at High Level. Outlook Bright for Business in General During Second Half of Year. Civilian Durable Goods May Be Brought Under Controlled Materials Plan.

Tendency to Relax

Regardless of what ultimately develops in Korea, the ebb and flow of the cease-fire negotiations have been closely followed by the business community. Despite the tenor of the President's midyear economic report, which strongly supports the Administration's previous recommendations for a record peacetime spending program, many observers hold that the reiterated plea for continued prosecution of the rearmament effort implies an official recognition that, once the close of armed hostilities was in prospect, Congress might scale down appropriations for military procurement and the urge toward preparedness might ease all along the line. The tendency to relax was apparent to some degree in July. Although most factors in the nation's economic outlook point to increased consumer spending, a budgetary deficit, and a new round of inflation, Congressional sentiment on the question of extending and modifying the Defense Production Act, which gives the Federal Administration authority over prices, wages, and the use of strategic materials, obviously did not reflect the Administration's—and others'—opinion of the urgent importance of strengthened controls at present.

This Survey Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

Although there seems to be widespread agreement among business analysts as to its temporary nature, signs of the lull in demand that has been observed in the past few months are still present. The general wholesale commodity price level, as measured by the official index, has declined for six consecutive weeks and is 2.3 per cent below the March peak. The sharpest wholesale price declines in recent weeks have been in textile products, lumber, and chemicals. Consumer prices, however, continued to rise until May 15, though a fractional decline was reported one month later.

Personal Income High

Most indicators of business volume suffer by comparison with figures reported for July, 1950. A comparison of this nature, however, is of questionable value, unless it is tempered by awareness that the 1950 figures were swollen by the sudden and partly irrational wave of buying following the Korean aggression. On the whole, indicators of business volume fail to reveal any conclusive evidence of a substantial decline in demand, except from the unusually high levels reached immediately after Korea and again six months later. Sales of department stores, after the subsidence of the buying wave last winter, were well sustained through June. Seasonally corrected data for July are not available. Total business sales declined somewhat from January to April but rose in May, and throughout the period were considerably above the 1950 level. The President's Council of Economic Advisers reports that the Federal Reserve index of industrial production in June remained unchanged for the third consecutive month at the highest level reached since World War II, and that business expenditures for plant and equipment in the second quarter of the year were at a record level, 48 per cent higher than a year earlier and five per cent higher than in the first quarter. Equally important, the CEA forecasts that such expenditures will be maintained at virtually the same level during the current quarter. Total personal income is estimated to have risen to a new all-time high in May, slightly exceeding the April figure, which has undergone a sharp upward revision from the original estimate.

Non-agricultural employment in June remained virtually unchanged at the May level, while farm employment registered a sharp seasonal increase. Unemployment rose, however, reflecting the large increase in the total labor force normally occurring at the end of a school year. The President, in his mid-year report, hinted at the possibility of an increase in the personnel of the Armed Services beyond the present 3.5-million goal, now almost attained. Such an increase would, of course, make further inroads on the civilian labor force. This matter, however, has yet to be decided by the Armed Forces.

In sum, the bottom can hardly be said to have fallen out of demand. On the contrary, most appraisals of the business outlook for the second half of this year place emphasis on such pertinent facts as the substantial shift upward of personal incomes and savings, prospective large business expenditures on new plant and equipment, and the currently scheduled increase in governmental spending without a commensurate rise in tax payments. These factors—it is believed—will offset any tendency toward relaxation

(*Turn to page* 132, *please*)

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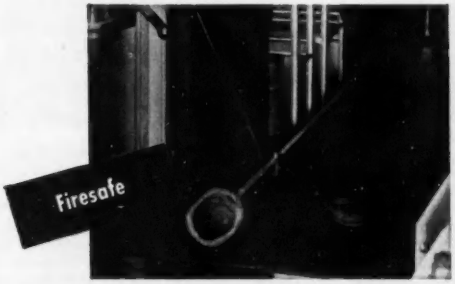

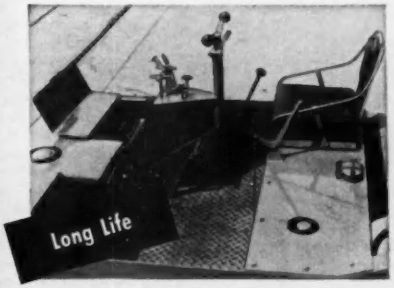

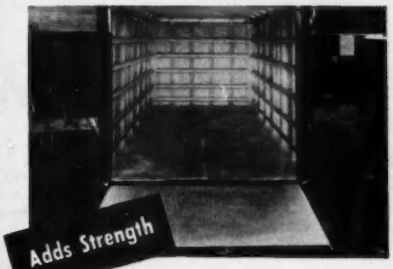

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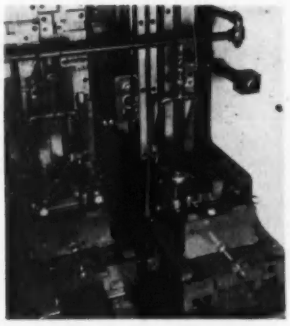
E-26—Double Ram Vertical Broach

Recently announced by the Cincinnati Milling Machine Co., Cincinnati, Ohio, is an improved duplex (double ram) vertical Hydro-Broach machine, currently built in five and 10 ton sizes (broaching force), 42 in. or 54 in., and 54 in. or 66 in. stroke, respectively.

Improved design is in the table construction. The rams operate alternately up and down, cutting on the down stroke. In front of each ram, an individual table advances to cutting position and retracts to loading position, synchronized with the movement of the rams. These tables operate over long square gibbed bearing ways, hardened and ground, and automatically lubricated. Like other Cincinnati vertical Hydro-broach machines, the tables and rams are actuated hydraulically. Dovetail clamping strips, located in accurately machined slots, clamp the fixture to the table. The table is exceptionally heavy, affording ample thickness for drilling and tapping clamping screw holes.

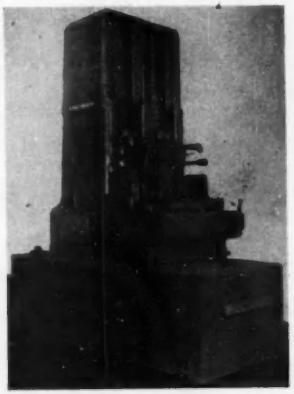


Cincinnati Duplex Vertical Hydro-Broach, No. 5-54, tooled up for four broaching operations on detents. Note table construction.

Protection of the hydraulic pump and valves is provided through fine mesh intake strainers and a filter connected in parallel to the hydraulic circuit. When the pressure on the filter increases to a predetermined value, a pressure gage, visible from the operator's working position, serves as an indication that the filter is becoming clogged and should be replaced.

An additional improvement, Preset Cycle Control, is an important safety feature. Formerly supplied as an attachment, this is now included as standard. The unit is a small shoulder-high electrical push button box extending from the front of the machine. With it, the operator can initiate the starting of the next cycle for either ram, if he has unloaded and loaded the corresponding fixture while the ram is returning. If he has not completed this duty, the ram automatically stops at the top of the stroke, and does not descend until the operator elects to touch the preset buttons. Two hands are required; both are out of the way of moving cutting tools.

(*Turn to page* 56, *please*)



Cincinnati Duplex Vertical Hydro-Broach, No. 10-66.

News of the Machinery Industries

Profit Control?

Although the National Production Authority wants an increase in the production of machine tools needed for the defense program, another Government alphabet certainly seems contradictory in its tendencies. In order to "assist" the machine tool builders to achieve their goal by offering price relief, the Office of Price Stabilization issued a directive, General Overriding Regulation 15 (Automotive Industries, August 1), which made price stabilization turn into profit control.

How can the machine tool industry gain any incentive to increase production rates with a 100 per cent excess profits tax on profits over five per cent? According to the OPS directive, that's just the way it operates.

Taking a few lines from a letter to Federal Senators and representatives, in which Frederick S. Blackall, Jr., president, Taft-Pierce Mfg. Co., and director-vice-president of the National Machine Tool Builders' Association, summed up the situation: "This procedure might better be termed price setting on a formula of inefficiency-plus. There is a sinister implication in the Regulation. It could well serve as a pattern to be applied to other industries. Is the Administration, under the guise of price control, seeking to establish the socialistic principle of profit control in the hope that it may remain in effect after the emergency is over?"

Industry Problems

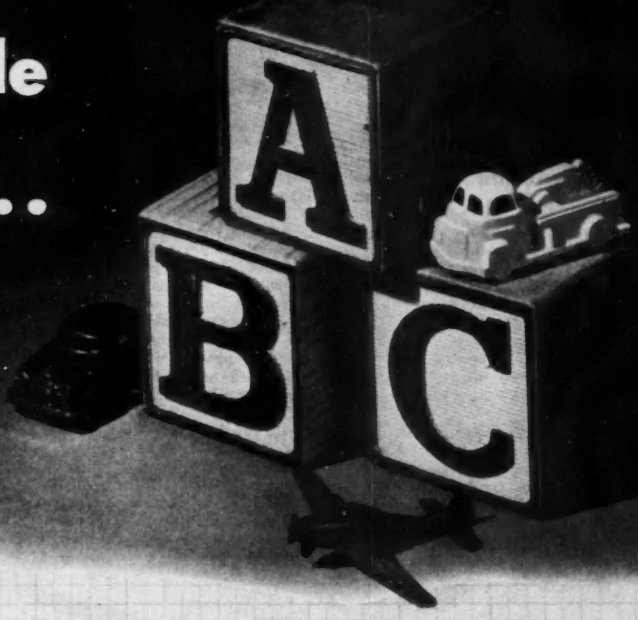
In a recent meeting of the NPA Machine Tool Mfrs. advisory committee, industry spokesmen said that they need more skilled labor, adequate financing, and super-priorities for materials, facilities and tools. They also asked for a form of increased depreciation for tax purposes on plant equipment used in two and three shift operations. Finally, industry members of the committee stated that sub-contracting would not solve the problem of machine tool shortages.

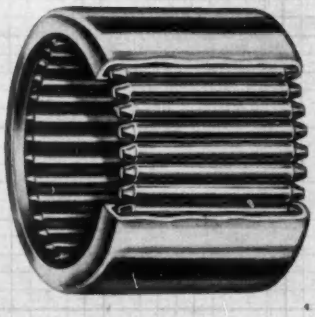
Price Clarity Needed

Then two days later the NPA came

(*Turn to page* 85, *please*)

simple as . . .





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(*Continued from page* 54)

E-27—Double-Action Hydraulic Press

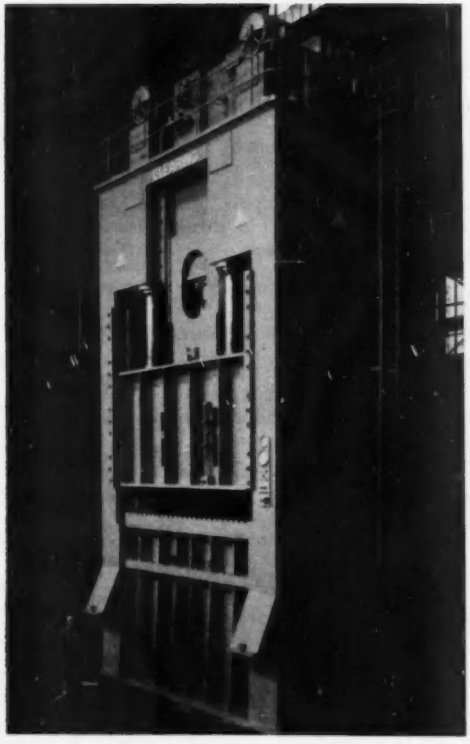
Flexibility for adaptation to a variety of work is a feature of a double-action hydraulic press recently built for the aircraft industry by Clearing Machine Corp., Chicago. The press has a frame capacity of 1500 tons, the punch slide delivering 1000 tons and the blankholder slide 500 tons. Maximum stroke of the punch slide is 80 in. and the press is arranged to draw and lift out a 30 in. piece.

Bed size is 96 in. by 162 in.. An auxiliary filler plate or sub-boiler is supplied so that minimum shut-height may be as little as 20 in. for first draw or shallow die work. Removal of the auxiliary filler plate makes the minimum shut-height 50 in.

Three pressing speeds are available to quick advance and return. Each speed can be used singly in conjunction with the quick advance and return, or any sequence of pressing speeds can be used, so that seven sequences of automatic operation may be chosen. Selector switches permit choice of double action operation, single action operation with or without the blankholder added and inching control.

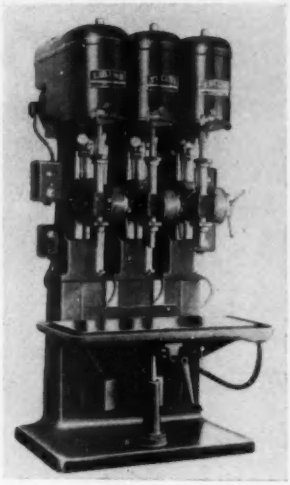
Relative positions of blankholder and inner slide may be adjusted to suit punches of any length. Movable lugs at each corner, with an arrangement of spaced keyways, permit adjustment by two in. increments. The same keyways are used with brackets furnished to tie blankholder and inner slide together for single action operation.

It is equipped with three hydropneumatic cushions with independent pressure adjustment up to a maximum of 150 tons on each cushion. Cushion stroke is 30 in.



Clearing 1500-ton double - action hydraulic press for the production of aircraft components.

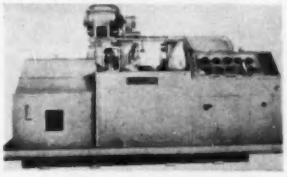
E-28—Drilling and Tapping Machines



Edlund drilling and tapping machine with variable speed drive, model 2F.

A line of variable speed drilling and tapping machines has been introduced by the Edlund Machinery Co., Cortland, N. Y. These model 2F machines have spindle speeds ranging from 200 to 2700 rpm; additional speeds from 50 to 675 rpm can be obtained with back gears. Capacity of the standard unit is ¾-in. for steel and ⅞-in. for cast iron. Model 2F machines are available with one, two, three, four, six or eight spindles; in pedestal or round column types; and with eight in. or 15 in. overhang distance from face of column to center of spindle.

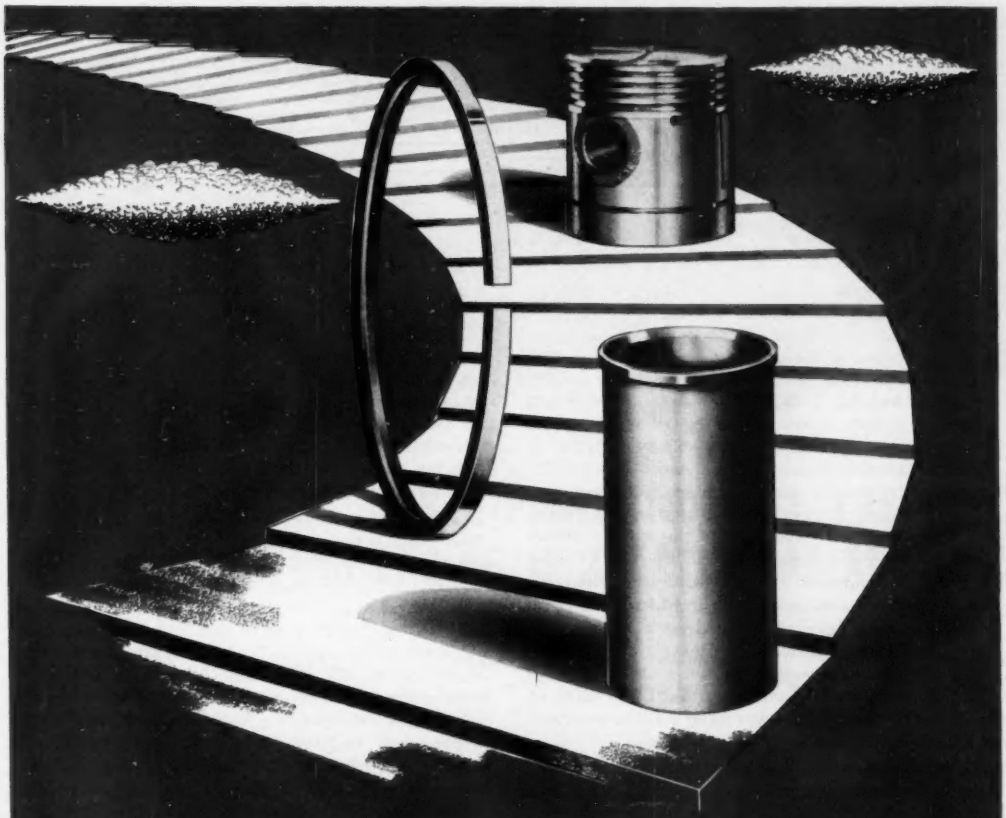
E-29—Automatic Bar Machine



Cleveland Automatic Machine Co. bar machine, Model AB.

Cleveland Automatic Machine Co., Cincinnati, Ohio, has recently redesigned the Model AB 2½-in. and three-in. capacity Cleveland Dialmatic bar machines to improve its single spindle automatics.

Improvements consist of substitution of a dynamic coupling and a conventional feed motor for the motor generator set and a dc motor in the electric feed drive.



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By ROBERT McLARREN

Up Our Sleeve

For many years it has been the policy of the Air Force to refuse permission for the export or licensing abroad of combat aircraft until such time as a superior airplane was not only available but its production plans initiated. Recent activities in the exporting of the Republic F-84E Thunderjet and the North American F-86E Sabre raise the question of the obviously secret successor to these first-line types on our own assembly lines. From General Vandenberg on down the line of rank, the Air Force has consistently pointed to the Sabre as our finest jet fighter and this aircraft currently holds the world's official speed record of 671 mph. However, the Sabre is now in quantity production by Canadair, Ltd., Montreal, and it has been announced that it will soon go into production by Commonwealth Aircraft Corp., Melbourne, Australia. Although no plans for production of the Thunderjet abroad have been made, production deliveries from the Republic Aviation Corp. plant at Farmingdale, Long Island, are being made to a variety of European air forces.

These developments suggest that a superior airplane is now in initial production to replace these two types but the Air Force has not yet revealed its identity. This reticence on the part of a usually immodest branch of the service, seems to indicate that there is not, at the moment, any radical new superfighter on the horizon and that the replacements for these two jet fighters will be only improved models of the existing types. On this score there is ample evidence. North American's new F-86D model features the latest General Electric J47 turbojet engine with afterburner, providing some 40 per cent increase in thrust over the engine in the Sabre used in Korea. Additionally, the new "D" model mounts radar equipment in its nose to provide "all-weather" operating capabilities.

Republic's replacement for the F-84E Thunderjet is the sweptwing F-84F powered by the Wright-built British Sapphire turbojet engine of 7220 lb thrust, the most powerful in current production. The vast production plans for this engine suggests strongly that the F-84F is slated to be the eventual "finest" jet fighter in the Air Force lineup.

Sonic Snare

While it has become as popular to dismiss the sonic barrier as a technical menace today as it was to point to it with alarm a few years ago, it nevertheless presents an imposing tactical barrier, despite the fact that it is obviously no longer an aerodynamic one. Current production jet fighters, while tacitly labelled "subsonic" types, are flirting constantly with the speed of sound. The latest North American Sabre jet fighter now in production operates regularly at about 95 per cent of the speed of sound and the big Northrop F-89 Scorpion all-weather fighter operates in that general vicinity. Both slip over the line to supersonic speed in shallow dives and this means that regular, production jet fighters are now ranged along the sonic line on a rather broad front.

The question the Air Force has been putting off for four years is the decision as to the exact point in the procurement program where the shift to the radical supersonic fighter must be made. Flying at sonic speed creates significant difficulties in combat, not only in the pilot's control task but in the tactical methods to be used. It has become increasingly apparent that the Air Force has simply decided to wait and see what happens as operating speeds gradually slip over the line. Both the North American F-86D and, particularly, the Republic F-84F, are supersonic combat airplanes, although they penetrate into this realm only slightly as compared to current research aircraft. Being subsonic designs they operate at supersonic speed only with great expenditures of power (and, therefore, fuel) and consequent losses in range and combat effectiveness. Apparently the Air Force wants to use this slight supersonic edge as an emergency burst of speed when needed and to confine the normal operation of these two fighters to the subsonic range.

It is inevitable, however, that the Air Force decide whether it is going into the business of the piloted supersonic aircraft or is going to relinquish this speed realm to the missile. This decision seems to us, however, to answer itself in favor of the piloted supersonic fighter since it appears most illogical that the enormous momentum of fighter plane development should be suddenly ended and the industry told "No more." Should this be true, the time is already passed when the radical shapes most useful for efficient supersonic flight be ordered onto the assembly lines and the vast range of procurement, pilot training, evolution of tactics, etc., be set in motion. Beyond all question, the scientific knowledge needed for the job is not only already here but has been for five years. The so-called "delta wing" configuration has been thoroughly tested; so, too, has the swept wing, the thin wing, the double-wedge profile, the myriad con-

(*Turn to page* 90, *please*)

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D-46 Cast-Weld Construction

Steel Founders' Society — Data on technical developments in the field of cast-weld construction, citing numerous examples of impressive metals conservation, production economies, improvements in functional design, and other engineering gains, has been released.

D-47 Cutting Tools

Weldon Tool Co.—Catalog No. 10, listing all stock and many types of special cutting tools made of high speed steel, cast alloys, or cemented carbide, is available to the trade.

D-48 Machine Lubrication

The Texas Co.—In the current issue of "Lubrication" there is an article, "The Heavy-Duty Automotive Vehicle Assembly Line," dealing with the care and lubrication of production machinery.

D-49 Aircraft Controls

General Controls Co.—Just published is a 32-page manual, 53-A, containing detailed descriptions of the company's line of "hi-G" automatic controls for aircraft.

D-50 Dynamometer

Clayton Mfg. Co.—A booklet entitled "A Proven Plan For Profitable Dynamometer Operation" has been released for distribution.

D-51 Grinders

Norton Co.—Piston relief grinding and form grinding of tools and dies are featured in Vol. 42, Number six of the firm's monthly technical publication.

D-52 Electrical Equipment

Leece-Neville Co.—A 24-page illustrated brochure on the firm and its electrical equipment for Diesel, gas, and gasoline engines is now ready for distribution.

D-53 Octane Ratings

E. I. du Pont de Nemours & Co., Inc.—Now available is the latest report on the octane rating and TEL content of gasoline marketed in various cities of the United States and Canada.

D-54 Brinell Table

Steel City Testing Machines, Inc.—A pocket-size table of Brinell hardness numbers, incorporating other tabular information has recently been published.

D-55 Electronic Timer

Photoswitch, Inc.—Bulletin PC5010 describes a new short interval electronic timer with a range from three to 120 cycles. Uses and specifications are listed.

D-56 Aircraft Hose

Resistoflex Corp.—A 12-page catalog on hose assemblies for aircraft is now being offered.

D-57 Pointing Machine

Economy Engineering Co.—Just off the press is a bulletin which illustrates and describes the type 4600 automatic pointing machine for bolts and cap screws.

(*Turn to page* 106, *please*)

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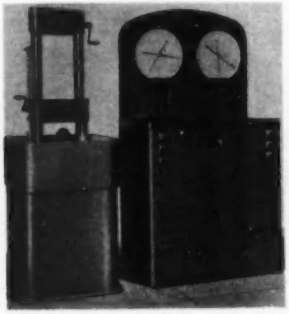
(*Continued from page* 56)

E-30—Universal Testing Machine

An improved, low-cost universal testing machine of 12,000 lb capacity has been brought out by Baldwin-Lima-Hamilton Corp., Phila., Pa. This new Model 12-H, like the 60-H of more than a year ago, provides a hydraulic loading unit separate from the indicating and control unit, which isolates the recoil from breaking test specimens and permits adjusting maximum or lazy hands with minimum drag.



Baldwin-Lima-Hamilton 12,000 lb testing machine.

A rigid, two-column design with 9⅛ in. of clear lateral space between columns gives high accessibility in handling specimens and simplifies observations. Load (either in tension or compression) is applied upward by an integrated piston and elevating cage consisting of the table, two uprights and upper gripping head, all of which have an 8-in. stroke. Loading speed can be varied infinitely between 0 and 10 ipm.

The lower gripping head is the upper member of a second adjustable cage, including two long columns extending down through the table to a lower crosshead supported by a vertical screw integral with the hydraulic cylinder. It is positioned by a motor drive mounted on the lower crosshead, which turns a nut on the screw by means of a worm gear. This drive provides an adjustment range of 20 in. for the entire cage which it moves at 10 ipm. Push button controls are on the front of the control cabinet.

Vertical distance between gripping heads may be set anywhere from 1 in. to 21 in., the latter including the stroke. Table is arranged for transverse testing and is drilled to secure standard transverse tools at spans of 10, 12, 16, 18, 22 and 24 in.

Loading controls on the table of the control cabinet govern the flow of oil to the loading cylinder by means of three valves. One is for directional control, one for loading and the other for unloading. Automatic safety devices protect gages against overloads and prevent over-travel of moving parts.

Two ranges are provided. The 12,000-lb range is graduated in 20-lb units on a 16-in. diameter indicator dial and a 3000-lb range is graduated in 5-lb units. Ranges other than standard—600 lb, 1200 lb, 2000 lb, and 6000 lb—are available in any dual combination.

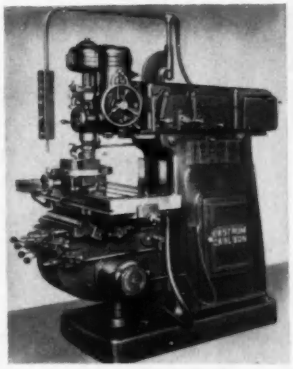
Bourdon gages for the two ranges are precision Emery type, with accuracy within one per cent or one dial division, whichever is greater. They are connected directly with the loading cylinder. A standard Baldwin recorder can be used with the machine if desired.

Overall dimensions of the two units in normal positions side by side are 5 ft 6 in. left to right, 2 ft front to back, and 6 ft 3 in. high.

E-31—Universal Vertical Milling Machine

Available to the trade is a universal vertical milling machine, model 5V Vertimil—an Ekstrom, Carlson & Co., Rockford, Ill., development—for precision tool and die work. Features of the unit are a ram-type head, a swivel head, a sliding spindle, a swivel table, and a four-way power feed mechanism.

Spindle speeds, a total of 12, range from 36 to 1200 rpm; feed speeds are 0.003, 0.005 and 0.008-in. per revolution both up and down. The spindle has a travel of eight in.



Ekstrom Carlson universal vertical milling machine, model 5V Vertimil.

Table size is 20 by 56 in. with a working surface of 20 by 48 in. Four 11/16-in. T-slots spaced 4½-in. apart are cut in the table. Longitudinal and cross feeds are from ⅜ to 12¾ ipm, while vertical feed of the knee is from ⅛ to 5½ ipm.

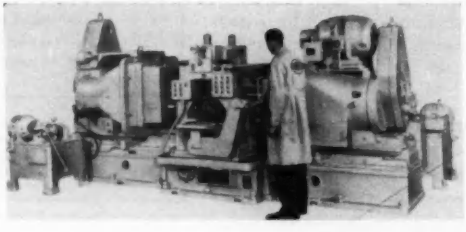
E-32—Controlled Heat Treat Unit

A fully automatic and controlled atmosphere unit for bright production heat treating, placed on the market by Ipsen Industries, Inc., is rated at 600 pieces per hr. The unit is designed for bright carburizing and bright carbonitriding, although straight heat treating or annealing can be performed.

The unit consists of two independently controlled heating zones sealed to a combination cooling chamber and quench tank. Work is automatically loaded, transferred and quenched.

The furnace is either gas or electric. The cooling chamber is water jacketed with automatic temperature control. The quench tank has built-in oil heating and cooling coils, with automatic temperature control. When insulated, it can be used for martempering. An air-draulic operated elevator is used for quenching.

E-33—Automatic Horizontal Tapping Machine



For tapping 47 holes in engine cylinder blocks National Automatic Tool Co., Richmond, Ind., developed this two-way horizontal automatic Holetapper It has a production capacity of 20 blocks per hr.

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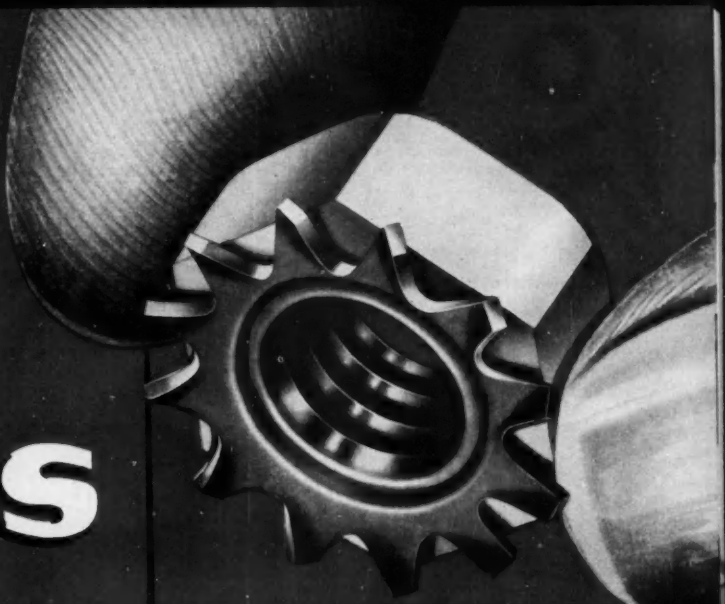

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- free spinning—easy to drive!
- every nut locked tight—the lock washer can't drop off

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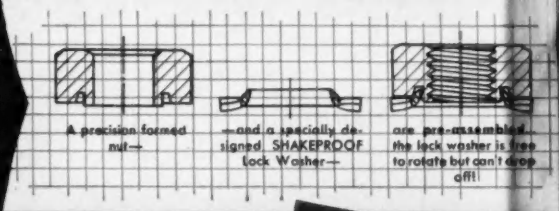
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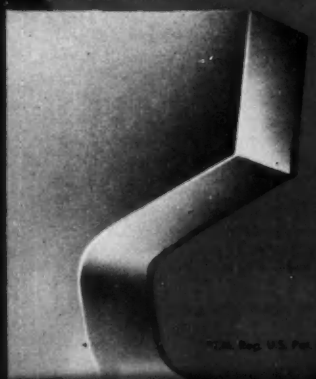

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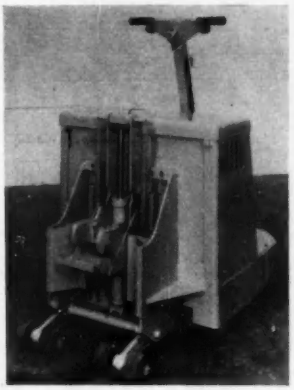
F-43—Motorized Tractor

For operation in narrow aisles and the spotting of loaded trailers, the Philadelphia Div., Yale & Towne Mfg. Co., has on the market a motorized tractor, called the Grip-Tow. In operation, it can automatically engage various types of industrial trailers. On a caster type trailer, it can make a right angle turn with the center of the turn being the fixed axle of the trailer.



Yale & Towne motorized tractor, the Grip-Tow.

To engage, the tractor is driven to the end of the trailer and a hook on the tractor contacts the lower side of the trailer frame. The hook then pulls the trailer into intimate contact with the tractor. Next, a pair of secondary hooks grab the top part of the trailer frame firmly engaging tractor and trailer.

Finally, the trailing wheels of the tractor lift off the floor so that the weight of the rear end of the tractor is supported on the trailer and both form an integral unit. The "Grip-Tow" tractor will operate successfully with almost any caster type trailer which has some projection of edge which the gripping mechanism can engage.

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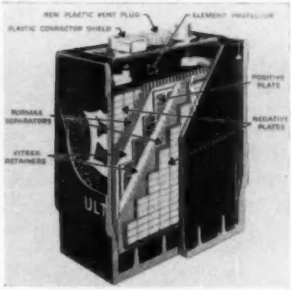
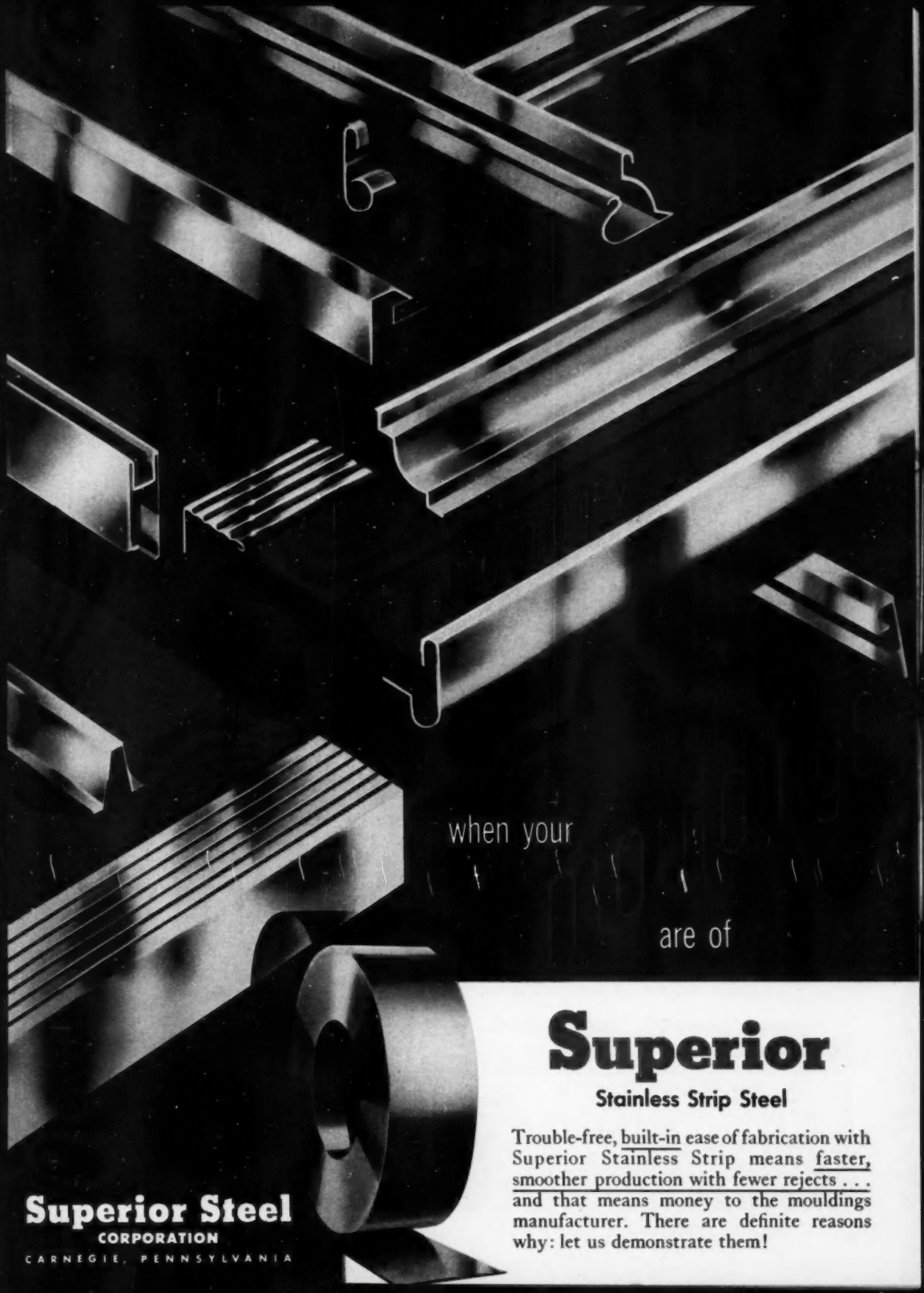
F-44—Automotive Storage Battery



Exide storage battery, the Ultra Start.

A long service life automatic battery, the Exide Ultra Start, was announced by its manufacturer, The Electric Storage Battery Co., Phila., Pa. Materials utilized for this development are Silvium, a corrosion resisting grid metal made of lead, silver, and other components; a new type high capacity active material; a low specific

(*Turn to page* 104, *please*)



Superior

Stainless Strip Steel

Trouble-free, built-in ease of fabrication with Superior Stainless Strip means faster, smoother production with fewer rejects . . . and that means money to the mouldings manufacturer. There are definite reasons why: let us demonstrate them!

Superior Steel
CORPORATION
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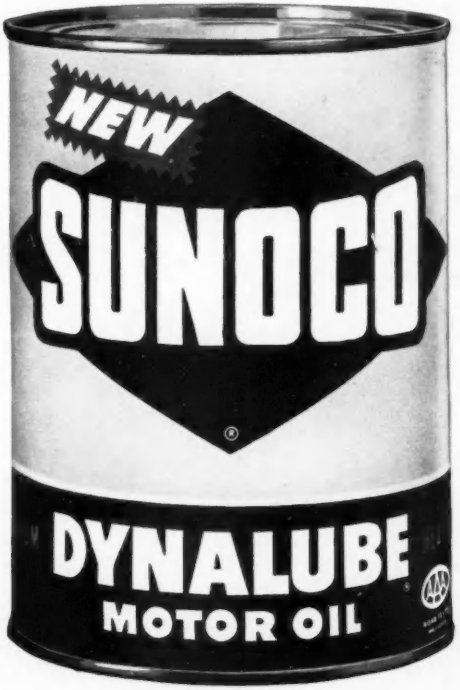
Heavy-duty or Premium?

New Sunoco Dynalube is BOTH!

Dynalube is One of the Very Few Motor Oils that meets or exceeds the Recommendations of All Car Manufacturers

Here's a great new motor oil that actually does the work of two different types of oils ... because NEW Dynalube is *both* heavy-duty and premium *in a single motor oil!*

Now, regardless of car manual recommendations, you no longer need to stock both "premium" and "heavy-duty" motor oils ... Sunoco Dynalube meets *both* requirements in *one* oil. You save money, time and space, reduce inventory ... simply by stocking NEW Sunoco Dynalube ... **and it costs no more than many oils that give a lot less!**



Memo to AUTO ENGINEERS

After road-testing NEW Dynalube and stripping down engines, the AAA certified these findings: "complete absence of injurious varnish or sludge" ..."all piston rings were free and clean"..."no carbon built up on underside of valves"..."complete absence of rust on cylinder bores and other moving parts."

Machining Jet Engine Parts

(*Continued from page* 40)

on the market flexible enough to deal with such a wide variety of hole patterns as Pratt & Whitney Aircraft was required to drill. The cost of making drill jigs from these numerous large rings would have been a major expense item.

To overcome this situation, P&WA's production engineers conceived a solution which the New Britain Machine Co. then executed; a three-head adjustable spindle circular type drilling machine, which is capable of handling any drilling pattern called for, without the need for expensive drill jigs and fixtures. The machine can drill, ream, and countersink at one set-up of the part, with only one tool in each spindle. In some cases it can handle two different components at one time. A fourth spindle will soon be added to the design.

The machine is, in effect, universally tooled. All that is required is a locating diameter and a checking ring, to make sure the operator puts in all the holes required. Changeover from one hole pattern to another is a matter of a few minutes. It is claimed that this saving in drill jigs can be figured at more than $1000 per jig.

With the new machine, the operator can easily see that the drills are kept always sharp, so that they are worked to their fullest capacity, yet changed quickly as soon as they become dulled. This feature is especially attractive when it is recalled that stainless steel and other gas turbine component materials tend to work-harden at an alarming rate the instant a tool doesn't cut freely. With the new drilling machine, the instant that a drill isn't cutting properly, it will immediately be detected by the operator and can be changed in a matter of seconds. Thus, saving in down-time for tool changes is considerable and production rates are increased.

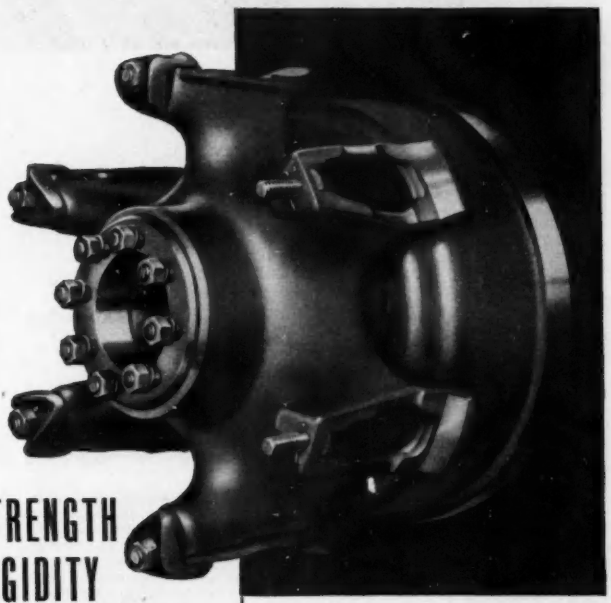
The 46-in. diameter table is mounted on a large spindle with two independent radial ball bearings, the outer bearings supporting the table nearly to the outer edge. As a result, the table can be rotated with the lightest touch of a finger. A large handwheel is fitted directly to the table for the convenience of the operator. The table is locked in working position for a particular drilling operation by means of a shot bolt (front center in the illustration) operated by an air cylinder.

The three drilling spindle supports can be moved about the circular base through approximately 300 deg of the perimeter, sliding on the two steel guide-ways, so that the spindles can be located at any desired points.

By swiveling the heads on their respective supporting columns, and by running the radial arms in or out in the holding brackets, any desired setting can be obtained. A single control pedestal contains the start-stop and feed and retract switches for all three spindles.

Changeover from one hole pattern to another can be made in a matter of 15 or 20 minutes, providing the multiple falls within the range of the index pins around the perimeter of the table. These index pins are initially spaced by means of ground circular disks of equal diameter, to give the correct chordal distance for the required number of holes. When odd locations are needed, the location of the index pin is determined by vee-links.

Operation of the machine is extremely simple. To rotate the table from one locating pin to the next, the operator retracts the shot bolt by stepping on a foot-treadle which trips an



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RIGIDITY
LIGHT WEIGHT are characteristics of

GUNITE

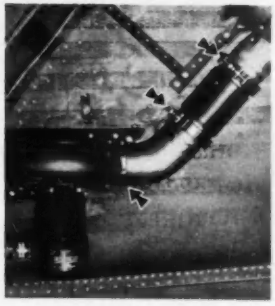
cast-steel wheels
for heavy-duty trucks and trailers

Minimum unsprung weight and maximum strength are engineered into all Gunite wheel designs. You get proven strength and rigidity in the Gunite cast electric-steel wheel.

WRITE FOR GUNITE CAST-STEEL WHEEL INFORMATION

GUNITE FOUNDRIES CORPORATION
FOUNDED IN 1854 • ROCKFORD, ILLINOIS

ENGINEERS' NOTEBOOK



Best Way to Connect Expansion Joints

Marman V-Band couplings answer all requirements for coupling expansion joints to hot air ducts as illustrated. They are light, go on and off fast because of the special latch design and provide positive, dependable seal.

Standard Marman V-Band Couplings find more and more usage in aircraft fabrication for connecting all types of tubes and ducts under a wide range of temperature and pressure requirements. Their range of application is virtually unlimited. Their standardized long proven design saves in production and servicing. Marman's long experience and specialized knowledge with Clamps, Straps and Couplings is unequaled.

Save cost, time and weight with Marman

Photos courtesy of Joy Manufacturing Co.

FOR INFORMATION, WRITE DEPT. A-8

MARMAN PRODUCTS CO. INC.

940 WEST FLORENCE AVENUE
INGLEWOOD, CALIFORNIA

7

STANDARD CLAMPS FOR SPECIAL APPLICATIONS

Jet Engine

(*Continued from page 67*)

air valve, then moves the table to the new location, stopping at the approximate center of the next index pin, and then releases the shot bolt which thereupon moves in slowly to engage the locating pin.

The new drilling machine was designed to drill and ream to within 0.005 in. of the true location. Tests have shown, however, that it will hold to within 0.002 in. This is well within the accuracy desired for these circles.

Future development of this machine calls for the incorporation of a horizontal drill head and also for a broaching spindle for certain key holes whose angular location must be kept extremely exact but which must have clearance to allow for expansion radially at high temperatures. These slightly elongated holes can then be broached at the same time without removing the part from the table.

Several steps forward in broaching practice have been taken in revising the procedure for broaching the fir tree roots of turbine blades. One of these is in forming both sides of the blade-root at one pass, another is in the introduction of individual teeth in the broach, rather than using multi-tooth sections. Both serve to increase the rate of production and at the same time increase the life of the cutting tools.

The previous method of machining these roots was to mill the "limbs" on one side of the "tree," then index the part and mill the limbs on the other side, using the same cutter. However, this gave neither the extreme accuracy required for these surfaces nor a low enough production time. So Pratt & Whitney Aircraft tool engineers have gone to a broaching-and-grinding operation which gives the gauge-like accuracy of finish that it is necessary to have for these turbine blades, and at the same time is a less costly job.

Broaching of both sides of the root at one pass is now carried out on a Lapointe 15-ton, 90-in. vertical broach. This setup differs from the usual broaching practice in that each individual tooth in the body is separate rather than having a number of teeth in one section.

The conventional multi-tooth setup imposed certain limits on the operation. Teeth could not be backed off or relieved to adjust the amount of cut, because they were so closely spaced. This can now be done. The multiple-tooth section could not be made as hard as the individual teeth can now be made. It has always required a high degree of skill to prepare broach sections with multi-teeth. Now the desired accuracy is obtained through controlling the forming of the grinding

(*Turn to page 72, please*)

To the Executive Planning for TOMORROW...

Progressive engineers and designers know that *now* is the time to be planning and preparing for *tomorrow*. And the men who are *really* future-thinking have a little "mental-memo" tacked up in the corner of the drawing board . . . a memo that reads "Plan on using aluminum."

Designers and engineers who have used aluminum in experimental and present day models know it provides a lighter, tougher, longer-lasting construction.

You can't afford to overlook the advantages of planning with aluminum . . . its consistent low price in the face of rising costs of other metals, its corrosion resistance and ease of fabrication, its natural attractiveness.

Add to these advantages the fact that with supplies of bauxite ore ample for generations, plus expanding aluminum production facilities, you are assured of a steadily mounting supply of *tomorrow's main metal.*

Reynolds Aluminum Specialists are now working with many companies on their future designs. They will be glad to work with your designers and engineers to assure you of the maximum benefits of aluminum.

Today, call the Reynolds office listed under "Aluminum" in your classified telephone directory. Or, write to Reynolds Metals Company, 2587 South Third Street, Louisville 1, Kentucky.

and to the Man in Charge of

TODAY'S PRODUCTION!

Do you have a defense contract that specifies aluminum? To eliminate production problems, acquaint yourself with the accepted production techniques for fabricating aluminum. Write for complete list of Reynolds technical books covering every phase of fabrication. And for *special development* problems, take advantage of Reynolds trained staff of aluminum specialists.

REYNOLDS METALS

REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND

Aircraft Subcontracting

(Continued from page 33)

In view of the fact that a number of the member companies of the Aircraft Industries Association, builders of aircraft, aircraft engines and aircraft components, are listed among these 50 firms, I feel sure you will welcome information which indicates the degree of subcontracting by this industry and the proportion of that subcontracting which is directed to small business.

It is to be noted that aircraft constitute the largest single item of Defense Department procurement. The distribution of a substantial percentage of the aircraft procurement dollar to small business, therefore, is recognized as important.

In order to apprise your committee of what the aircraft industry is doing toward spreading its production base, we recently delivered to your Special Counsel, Mr. John E. Newby, Jr., copies of a recent study made by our association captioned "Background Information on Subcontracting and Supplying in the Aircraft Industry." This information apparently was not taken into account in your committee's report.

I cite a few selected portions of the Aircraft Industries Association study mentioned above which I feel are particularly pertinent to the subject:

1. The aircraft industry, as of last May, was using 60,851 subcontractors or suppliers (this number has increased since the study was made).

2. Of this number of subcontractors and suppliers, approximately 52,200 or 87 per cent are small business firms—those companies defined by the Department of Defense as employing 500 or fewer persons.

3. Of the total dollar volume of orders received by the aircraft manufacturers, approximately 50 per cent is spent with outside firms. Of this 50 per cent, about 60 per cent goes to small business (this percentage also has increased since the study was made).

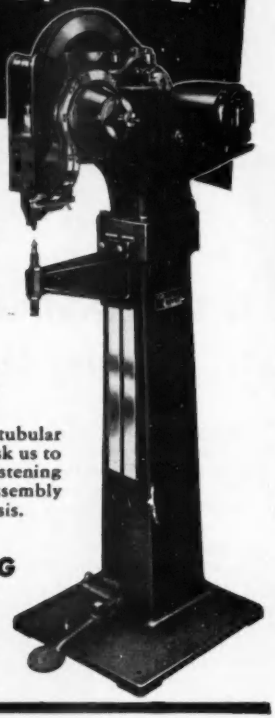
As this study indicates, aircraft companies are subcontracting large proportions of their work. Obviously, they must exercise care in the selection of their subcontractors because of the highly specialized nature of aircraft production and the extremely close tolerances demanded by modern military aircraft, engines and components.

It would be impossible for the Armed Services to achieve their aircraft production goals without placing the primary production responsibility in the hands of the established aircraft manufacturing industry. Our industry cannot perform its production responsibilities without extensive utilization of the productive capacities of subcontractors and suppliers.

I am enclosing copies of our study on this subject which I trust you will find of interest.

Sincerely yours,
(signed) D. C. Ramsey.

Chicago RIVET "912"
AUTOMATIC RIVET SETTER
CUTS COSTS 3 WAYS



1 FASTENS FASTER . . .
Only the speed of the operator limits the 912's riveting speed. Completely automatic. A push on the foot pedal automatically feeds, inserts and clinches the rivet.

2 DOES WORK OF SEVERAL MACHINES
Quick change rotary hopper and raceway makes the 912 adjustable in 5 to 10 minutes to set different size rivets. Adjustable anvil height and 12-inch throat provide further versatility.

3 SAVES ON MAINTENANCE . . .
The 912 is massively built to stand the shocks of constant use and is designed for quick, easy servicing and parts replacement.

If your assembly calls for 3/16" steel tubular rivets or smaller, of ¾" lengths or less, ask us to show you how the 912 can cut your fastening costs. Send a sample of your problem assembly (or blueprint) for a free fastening analysis.

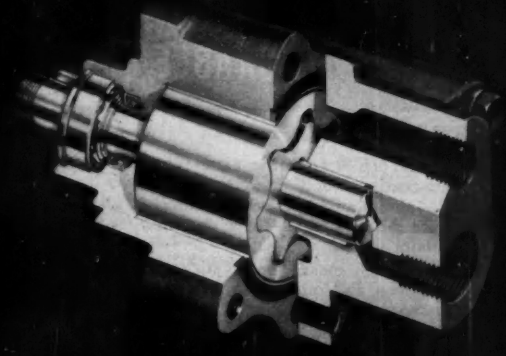
FREE CATALOG
contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

Chicago Rivet & MACHINE CO.
9612 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois
Branch Factory: Tyrone, Pa.

BOOKS . . .

PUNCHING, SHEARING, BENDING, by *William C. Tucker*, published by *Buffalo Forge Co., Buffalo, N. Y.* Price $3.00. The fundamentals of punching, shearing and bending are described, including the operation of various machine tools used for this work.

CARBIDE CUTTING TOOLS, prepared by *American Technical Society*, sponsored by *Vascoloy-Ramet Corp., Waukegan, Ill.* Price $5.50. This work offers complete information about carbides and cutting problems gathered from many sources. Its 17 chapters cover the development of tools since the beginning of their history to the use of carbides for cutting tools.



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Provide a low-cost source of hydraulic power for a wide range of automotive, industrial, and farm implement applications. Outstanding characteristics are: long life, quiet operation, high mechanical efficiency, and easy maintenance.

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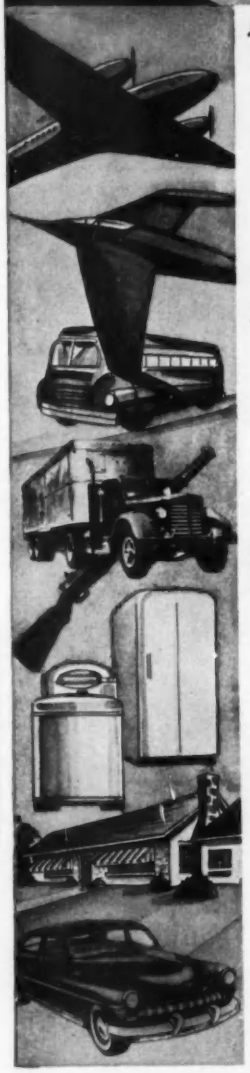

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"GRANODINE"® forms a zinc-iron phosphate-coating bond on sheet metal products—automobile bodies and fenders, refrigerator cabinets, etc.—for a durable, lustrous paint finish.

"LITHOFORM"® makes paint stick to galvanized iron and other zinc and cadmium surfaces.

"ALODINE",® the new ACP protective coating chemical for aluminum, anchors the paint finish and protects the metal.

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"PERMADINE",® a zinc phosphate coating chemical, forms on steel an oil-adsorptive coating which bonds rust-inhibiting oils such as "Granoleum."

"THERMOIL-GRANODINE"® a manganese-iron phosphate coating chemical, forms on steel a dense crystalline coating which, when oiled or painted, inhibits corrosion.

PROTECTION FOR FRICTION SURFACES

The oiled "THERMOIL-GRANODINE" coating on pistons, piston rings, cranks, camshafts and other rubbing parts, allows safe break-in operation, eliminates metal-to-metal contact, maintains lubrication and reduces the danger of scuffing, scoring, galling, welding and tearing.

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"GRANODRAW"® forms on pickled surfaces a tightly-bound adherent, zinc-iron phosphate coating which facilitates the cold mechanical deformation of steel, improves drawing, and lengthens die life.

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AMERICAN CHEMICAL PAINT COMPANY

AMBLER, PA.

Manufacturers of Metallurgical, Agricultural and Pharmaceutical Chemicals

Jet Engine

(*Continued from page* 68)

wheels which dress the broach teeth—thus the teeth can be ground by a workman of average ability.

This new Pratt & Whitney Aircraft setup represents another departure from usual broaching practice in breaking away from the idea that several teeth should be in the cut at one time. Because today's machines are so constructed that the ram guides give firm control over alignment of the stroke, the teeth can be used for their primary function—cutting. With the teeth spaced more widely than in the older method, greater chip clearance is provided.

Because of the character of the metal used for these particular blades, the roots are broached 0.005 in. oversize, the remaining stock being removed on a surface grinder, whose wheel is dressed with a Diaform dresser, at a 10-to-1 ratio, or on a two-wheel Ex-Cell-O or J & L grinder designed for this operation. By this combination of broaching and grinding the desired accuracy of finish is obtained and yet the operation is less costly than the old method of milling.

Pratt & Whitney Aircraft expects to make further advances with this method of broaching using individual teeth, as mass-production of Turbo-Wasp jet engines proceeds, until it is broaching all the surfaces of the blades for both compressors and turbines, except the airfoil surfaces.

A particularly attractive feature of this use of individual teeth is that each tooth can be used up completely. This means an appreciable saving in the consumption of high speed cutting steels.

A still further step now receiving attention is the use of carbide tips on these individual broach teeth. This is really the motive behind developing the individual tooth idea in making broaches. As the materials used become more difficult to machine, the need for carbides and the know-how of grinding them clearly becomes more urgent.

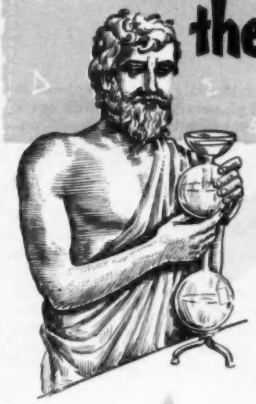
Producing axial-flow gas turbine engines calls for making large numbers of large diameter, thin-walled rings and weldments which call for close control of size and surface finish that can best be achieved on a grinding machine. Subsequent operations required on these parts—such as recessing and chamfering—would ordinarily be done on another machine, for example an engine lathe or a boring mill.

But Pratt & Whitney Aircraft engineers conceived the idea of a combination-machine which carries out the lathe operation while the ring is still mounted on the grinder. By mounting the cross slide from a Monarch engine

(*Turn to page* 94, *please*)

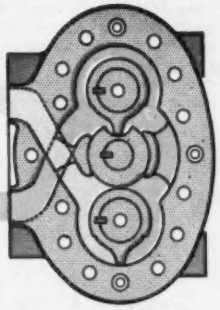
the Greeks had a word for it, too-

(OVER 2000 YEARS AGO)



CONTINUOUS FLOW

By inventing the turbine some 2000 years ago, the great Greek mathematician, Heron of Alexandria (popularly known as Hero), first put the principle of "continuous flow" to work for mankind. As he experimented with water clocks, steam engines and fountains, Hero could never have known that some of his scientific principles would still be in use in our own twentieth century. The intelligent Greeks of old truly seemed to have a word for almost everything.



TODAY

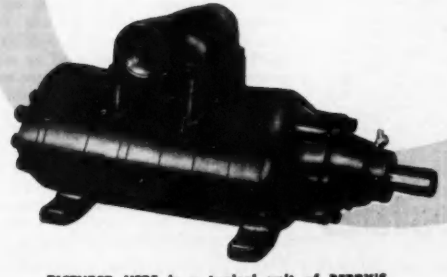
BERRY hydraulics says it much better

With the invention of the revolutionary BERRY principle for hydrostatic hydraulics, we now have the first "continuous flow" machine since Hero's time. Designed to put hydraulic power to work continuously, smoothly and economically, BERRY hydraulic pumps and motors feature simple construction, incorporating the unique rotary piston principle which eliminates frictional contact between operating parts and their mating members.

The industrial applications of the BERRY hydraulic power transmission system are unlimited. Hydraulic units in this system may serve either as pumps or as fluid motors, with equal performance in either direction of rotation. In all probability the new BERRY principle of continuous flow power can provide the complete answer to your particular hydraulic problem.

BERRY OFFERS YOU SPECIAL ENGINEERING SERVICE

BERRY engineers will be happy to help you find the answer to your particular hydraulic problems. An inquiry stating your requirements will receive immediate attention.



PICTURED HERE is a typical unit of BERRY'S popular 1400CH series of motors and pumps.

Features of the BERRY principle

- Continuous spiral liquid path of uniform cross section provides steady uninterrupted flow throughout power or pumping operation
- High or low input or output speeds
- Smooth, positive, pulsationless power delivery with instantaneous reversibility
- Shockloads well in excess of specified pressures provided for by sturdy construction
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- Precision machined clearances between pump housing and rotating piston and abutment valves eliminate all metal to metal "rubbing" contact, reducing heat generation
- Utmost flexibility in speeds and operating temperatures

BERRY DIVISION

OLIVER IRON & STEEL CORPORATION

General Offices: PITTSBURGH 3, PENNSYLVANIA

Plant At CORINTH, MISSISSIPPI

A History of Automatic Transmissions

(*Continued from page 37*)

Reo Self-Shifter

It consisted of two two-speed transmissions connected in series. For ordinary driving only one of the units was used. Gears were changed automatically, according to car speed, through the engagement of a centrifugal, multiple-disk clutch, from drive through a gear train comprising spur and internal gears to a direct drive. The secondary unit, shifted manually, gave an additional reduction. It was used and produced by the Reo Motor Car Co.

Mono-Drive

A semi-automatic transmission was developed by Oscar H. Banker and used by General Motors for buses. It utilized a centrifugally actuated automatic clutch and planetary gearing with overrunning clutches. Shifts were controlled by the accelerator pedal.

1936

Electric Hand

A preselective type unit, it used an electrically shifted transmission of the sliding gear type with a vacuum operated wet clutch. Shifts were made automatically through a mechanical governor. This device was used by Hudson Motor Car Co. for its production cars until 1939.

1937

Rieseler

This was a hydraulic torque converter with direct drive clutch, and hydraulically actuated planetary gearing. It was made and used for Mercedes cars in Germany and was installed in a Buick for test.

Safety Transmission

A forerunner of Hydra-Matic, it was composed of two hydraulically operated planetary units for forward, a sliding type reverse gear, and a conventional disk clutch. Both Buick and Oldsmobile used it in 1937.

Spicer Torque Converter

Spicer Mfg. Co. produced the Model 90 torque converter, of the Lysholm-Smith type, for large General Motors buses. The converter was made under license from Ljungstrom Steam Turbine Co. of Sweden. Another unit, Model 91, was produced in 1940 for small GM buses. The firm later made converters fror military vehicles during World War II.

1938

Twin Disc Torque Converter

A three-stage, single-phase torque converter was developed by the Twin Disc Clutch Co. This unit, similar to the Lysholm-Smith, was used by many railroads for railcars and by some manufacturers of off-the-highway vehicles. Allis-Chalmers Mfg. Co., one user of the unit, was the originator of the torque converter application in the tractor industry. A later design of this converter incorporates a downhill braking feature and numerous improvements. Converters were also made by Twin Disc for military vehicles during World War II.

(*Turn to page 78, please*)

Expressly Designed for Modern Sealed Cooling Systems

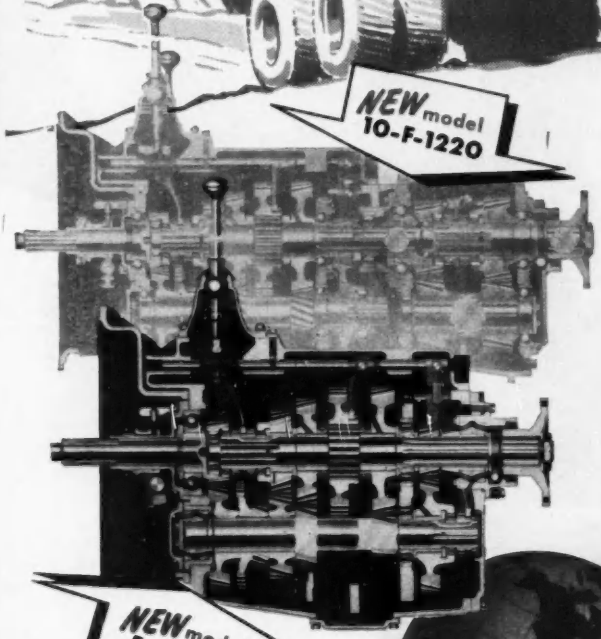
Dole DV Thermostats, used in leading makes, have proved their ability to operate positively against high pump pressures. They offer this high efficiency also for cars and trucks with atmospheric systems. Thus, Dole DV's help all cooling systems to assure quick warm-up—with quicker heat from the car heater—and savings of gasoline, oil and motor wear.

DOLE

Control with Dole DV Thermostats

THE DOLE VALVE COMPANY
1901-1941 Carroll Avenue, Chicago 12, Illinois
Representatives in Principal Cities

Puts 400 hp to work...



Here they are, the *new* Series 1220 Fuller Transmissions . . . even bigger, even better for the heaviest going than the famous Series 1120, heretofore the biggest in the field.

These new 1220 Series Transmissions already are being used behind the more powerful engines needed to move top loads over toughest grades . . . already are proving themselves in putting up to *400 hp* to work.

The Series 1220 is offered in two versions—the 5-speed 5-F-1220 and the 10-speed 10-F-1220.

Both include all-helical gearing, short shifts, fast shifts, exactly the right gear ratios to keep engine rpm up. They include, in fact, all the features which make the 1120's so famous—plus the extra "beef"... to handle the extra horsepower.

To put 400 hp to work, on the toughest jobs, specify the Fuller 5-F-1220 or the Fuller 10-F-1220 *Heavy-Duty* Transmission. Write today for complete information on the *biggest in the field.*

Fuller TRANSMISSIONS ®

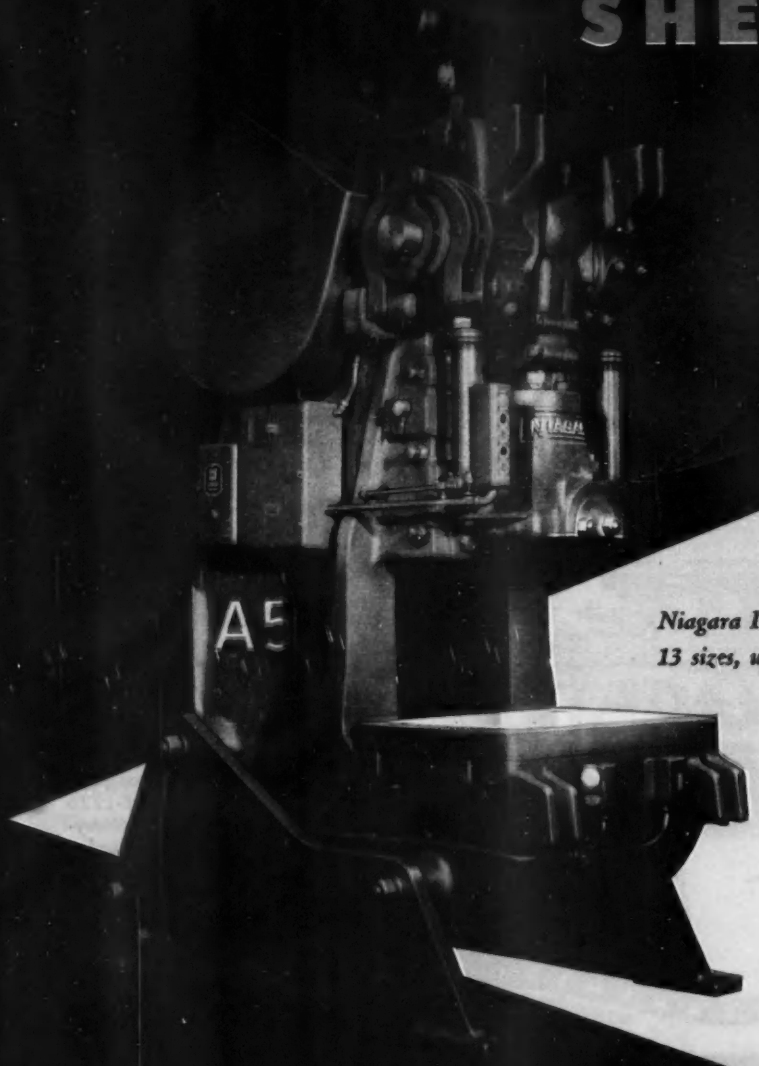
where horsepower goes to work

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

NIAGARA

PRESSES AND SHEARS



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13 sizes, up to 6 1/2 inch shafts.

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for Defense Production

• The sound engineering and long practical experience, incorporated in the design and construction of Niagara Presses and Shears, pay dividends in increased production and low maintenance cost . . . two essentials in the defense program.

Write for Bulletins

Manufacturers of a Complete Line of Sheet Metal Working Equipment Ranging from Small Hand Tools up to Large Power Operated Machinery.

Niagara Power Squaring Shears. Capacity from shim stock up to 1 inch thick steel. Lengths 3 feet to 20 feet.

DISTRICT OFFICES: DETROIT, CLEVELAND, NEW YORK

GUNS and ~~or~~ BUTTER

"Guns or Butter"... this crew is producing both ... essential equipment for our fighting men and parts for civilian consumption.

If this is an all-out struggle for survival ... and we believe it is ... defense needs must come first. Devoting approximately one-fifth of the nation's productivity to armament work will cause some disruption in our civilian economy. It need be only temporary. The answer is production ... production ... and still more production.

The demand for "guns *and* butter" is a direct challenge to American industry and to each of us who form a part of it. Kropp Forge Company, *America's Number One Forge Plant*, will attempt to meet that challenge ... devoting our complete drop, hammer and upset facilities to the job of hammering out more and more quality forgings for defense and essential civilian production.

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Sprocket forging, 27" diameter, 1½" thick, weight 82 lbs.

KROPP FORGE COMPANY
5301 W. Roosevelt Rd., Chicago 50, Ill.

Are you receiving "FORGINGS".... the KROPP publication for industry? If you want to keep current on forging facts, send us your name and address and ask for "FORGINGS".

Automatic Transmissions

(*Continued from page 74*)

1940

Hydra-Matic

Three planetary units, operated hydraulically, are used with a fluid coupling. Gear changes are controlled by car speed and the accelerator pedal. It was developed and produced by General Motors and used on the following vehicles up to the present: Oldsmobile started in 1940; Cadillac 1941, Pontiac 1948, GM buses 1949, Lincoln 1949, Nash, 1950, Kaiser-Frazer 1950, and Hudson 1951. It was also used on U. S. Army tanks during World War II.

1941

Electromatic Drive

A vacuum operated, electrically controlled clutch and an automatic overdrive combination was used by Packard Motor Car Co. on production automobiles until 1950. The three-speed transmission was shifted manually but clutch operation was automatic.

Fluid Drive

Chrysler Corp. used a fluid coupling with a standard transmission and a disk clutch in Chrysler cars in 1941 and later on De Soto and Dodge automobiles. Shifts were made conventionally.

Vacamatic and Simplimatic

A constant-mesh four speed and reverse transmission along with a fluid coupling and a manually operated disk clutch were used by Chrysler Corp. on Chrysler (Vacamatic) and De Soto (Simplimatic) automobiles. This transmission gave two speed ranges; shifting between each range was done manually along with the manual disengagement of the disk clutch. Shifting between the two speeds in each range was controlled by car speed and the accelerator pedal.

1942

Liquimatic

This unit used a fluid coupling, three speed transmission, a disk clutch and automatic overdrive. The clutch and shifting mechanism were vacuum operated. Ford Motor Co. announced this transmission for Mercury and Lincoln automobiles.

Turbo-Matic

A transmission consisting of a fluid coupling, a vacuum operated disk clutch, a three-speed transmission and automatic overdrive was used by Studebaker Corp. for a few of its 1942 model

(*Turn to page 80, please*)

Kelsey-Hayes

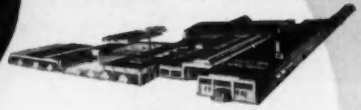
Know How

...in DEFENSE and PEACE-TIME production

Kelsey Hayes

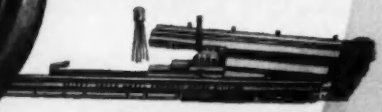
Kelsey-Hayes
Los Angeles, Cal. Plant

Kelsey-Hayes
Detroit, Mich., McGraw Plant



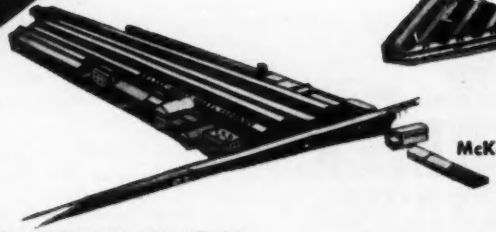
Kelsey-Hayes
Windsor, Ont., Canada Plant

Kelsey-Hayes
Detroit Mich., Military Plant



Kelsey-Hayes
Jackson, Mich. Plant

Kelsey-Hayes
Davenport, Iowa Plant



Kelsey-Hayes
McKeesport, Penna. Plant

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- Electric brakes, brake power equipment, power chambers . . . and valves for all types of military and civilian vehicles.
- Shells and shell casings, rockets, and aircraft engine parts, etc.

KELSEY-HAYES WHEEL COMPANY
MILITARY AVE., DETROIT 32, MICHIGAN

Automatic Transmissions History

(*Continued from page 78*)

cars prior to World War II. The device was controlled by car speed and accelerator pedal. The unit had three ranges—cruising, traffic, and low. Overdrive cut in for each range giving a six speed and reverse transmission.

Drive-Master

Brought out by Hudson Motor Car Co. and installed on its cars since 1942, this device consists of a vacuum operated wet clutch and three-speed transmission. It shifts automatically between second and high; other gears are shifted manually without using the clutch pedal. It is controlled by car speed and accelerator pedal.

1944

Brockhouse Turbo Transmitter

A five element torque converter was produced by J. Brockhouse & Co., Ltd., England, and installed on various English trucks. Stall torque multiplication was 4.2 to one. Drive was always through the converter.

1946

Hydro-Torque Drive

White Motor Co. produced the first American designed torque converter to be used specifically for buses. The entire assembly consisted of a torque converter in combination with a two-speed syncro-mesh gear box. Gears were shifted automatically by air pressure and drive was always through the converter. It is still being used for White buses.

Spicer Torque Converter

Spicer Mfg. Co. brought out a line of four hydraulic torque converters—916, 918, M-61, and M-81—all of which are single-phase, three-stage units with a direct drive clutch. Torque multiplication at stall is approximately six to one. These units are used in buses by ACF-Brill Motors Co., CCF-Brill Motors Co. of Canada, Mack Mfg. Co., General-American Aerocoach, Southern Coach Co., Twin Coach Co., and Leyland Motors of Canada.

1948

Dynaflow

This five element torque converter combined with a planetary transmission marked the first use of a hydraulic torque converter in a large production automobile—the Buick. The planetary gear box consists of one compound planet. Drive is always through the converter. Maximum torque multiplication of the converter is 2.25 to one.

Allison

Produced by the Allison Div. of General Motors Corp. A four element torque converter with two free-wheeling stators. Maximum torque multiplication is four to one, and drive is always through the converter. It is used, at present, for the E. G. Budd railcar and various other automotive applications.

M-6

This is similar to the Vacamatic and Simplimatic of 1941 except for hydraulic operation replacing vacuum operation. Shifting is controlled by car speed and accelerator pedal. Made by Chrysler Corp., it is used for Chrysler (Presto-Matic), De Soto (Tip-Toe-Matic), and Dodge (Gyro-Matic) cars.

1949

V-Drive

Developed for transverse engine

Engineered by
BORG & BECK®
means . . . CLUTCHES built to the exacting standards which have made the name BORG & BECK famous for 36 years!
YOU CAN DEPEND ON
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CLUTCHES... FOR THAT VITAL SPOT WHERE POWER TAKES HOLD OF THE LOAD
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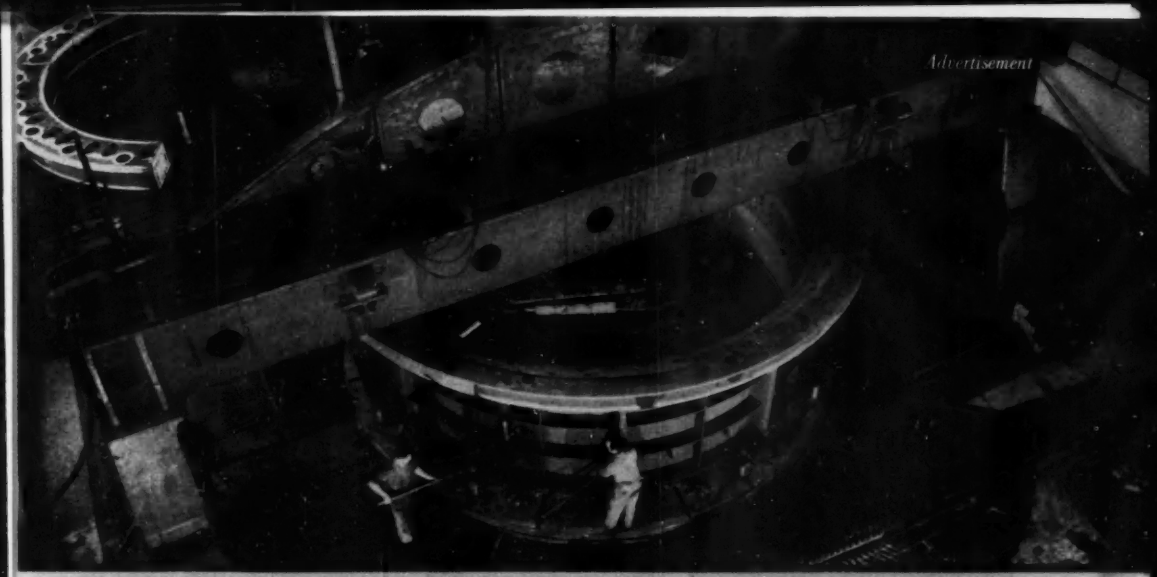

$400,000 VERTICAL BORING MILL, one of the world's largest, bores, turns and faces hydraulic turbine parts. Sunoco Way Lubricant, approved by 39 machine tool builders, was selected by the design engineers to prevent stick-slip with resultant scoring of ways and slides. Even under the weight of work as heavy as 75 tons, Sunoco Way Lubricant has never squeezed out.

TURBINE PARTS 62 FEET IN DIAMETER MACHINED BY HUGE VERTICAL BORING MILL

This mill was installed eight months ago by S. Morgan Smith, well-known hydraulic turbine manufacturer. Without alterations, it can take work up to 22 feet high with a maximum swing of 42 feet between housings. By removing the housings and adding a head to the face plate, it can be modified to handle parts 62 feet in diameter. Sunoco Way Lubricant, specified for the ways and rails by the design engineers, has been used exclusively. The mill accommodates work that weighs as much as 75 tons. No jump or stick-slip has ever marred a finish or impaired accuracy. The ways and rails remain like new. This is typical of the performance that has won the endorsement of 39 machine tool builders for Sunoco Way Lubricant. For an informative booklet and sample, write on your business letterhead to Sun Oil Company, Department AA-8, Phila. 3, Pa.

ELECTRONICALLY CONTROLLED CUTTING TOOLS machine a turbine discharge ring 9' high, 27' 8" dia., 21' 8" bore. Sunoco Way Lubricant keeps rails free of rust and corrosion. Starting up after week-end shutdowns, tables and other parts move freely on the ways and slides without jump or stick-slip.

THE SYNCHRONOUS GEAR DRIVE, controlling table speeds from .094 to 6.045 rpm., is pressure-fed with another Sun "Job Proved" product—Sunep. This extreme pressure lubricant is exceptionally stable, minimizes wear, gives long-time protection to very heavily loaded teeth in many types of gear boxes.

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mounting, the unit consists of a hydraulic torque converter of the three-element type, a direct drive clutch, a double acting disk clutch, a pair of bevel gears, and a reverse gear train. Manufactured by Allison Div. of General Motors, it is used for buses by General Motors Truck & Coach.

Ultramatic

Presently used by Packard Motor Car Co. for the Packard automobile, it is a four element torque converter combined with a planetary transmission. A direct drive clutch is employed. One compound planet is used. Stall torque multiplication of the converter is 2.4 to one.

1950

Powerglide

This is a five-element torque converter in conjunction with a planetary gear box. Drive is always through the converter; it has a torque multiplication at stall of 2.2 to one. The planetary unit consists of one compound planet. Chevrolet uses it as optional equipment on passenger cars.

Studebaker Automatic Drive

A three-element hydraulic torque converter, a direct drive clutch, and a three speed and reverse planetary gear box are used for this transmission. Second to high gear is changed automatically and the direct drive clutch automatically bypasses the torque converter. The device is controlled by car speed and the accelerator pedal. Stall torque multiplication of the converter is 2.15 to one. Manufactured by Borg-Warner Corp., it is used by Studebaker Corp. for passenger cars.

Fordomatic and Merc-O-Matic

Used by the Ford Motor Co. in Ford (Fordomatic) and Mercury (Merc-O-Matic) cars, this transmission is composed of a three-element torque converter and a three speed and reverse planetary gear box. Up and down gear changes between second and high are automatic, and drive is always through the converter. It is controlled by car speed and accelerator pedal. The unit is produced by Borg-Warner Corp.

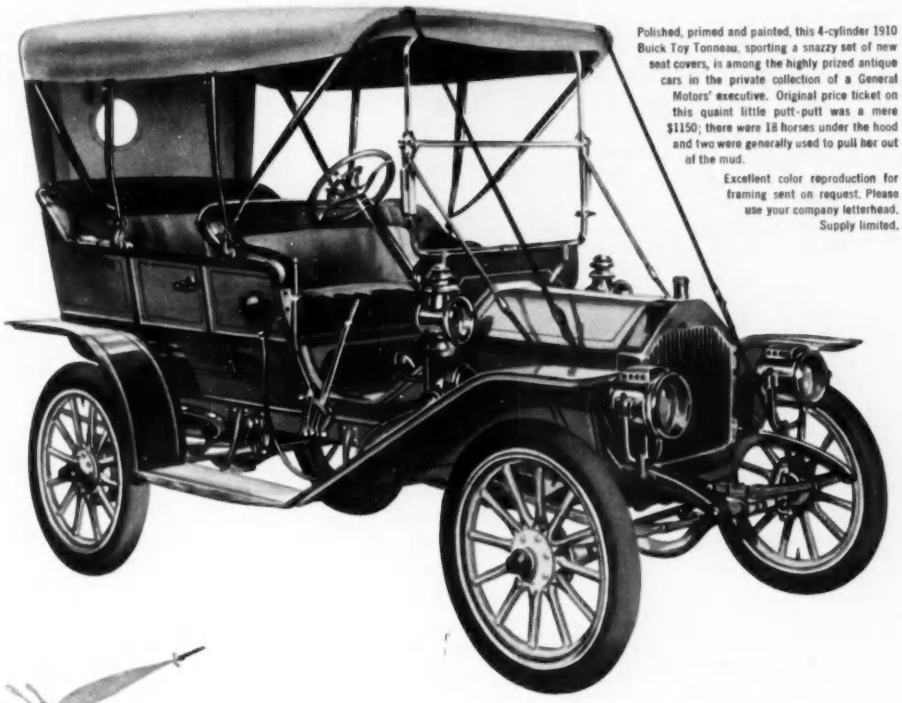
Super-Matic

This is the same basic Hudson Drive-Master, 1942, with the addition of automatic overdrive. It is used on passenger cars by the Hudson Motor Car Co.

Fuller

Fuller Mfg. Co. produces this three-element torque converter that is used in conjunction with a manually operated two-speed gear box. Maximum

(*Turn to page* 85, *please*)



Polished, primed and painted, this 4-cylinder 1910 Buick Toy Tonneau, sporting a snazzy set of new seat covers, is among the highly prized antique cars in the private collection of a General Motors' executive. Original price ticket on this quaint little putt-putt was a mere $1150; there were 18 horses under the hood and two were generally used to pull her out of the mud.

Excellent color reproduction for framing sent on request. Please use your company letterhead. Supply limited.

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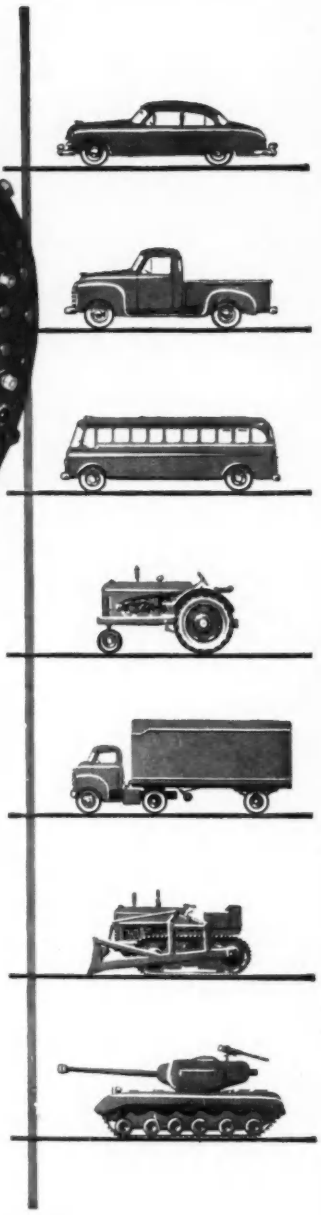

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ENGINEERING BW PRODUCTION

LONG
CLUTCHES • RADIATORS • TORQUE CONVERTERS
OIL COOLERS

(*Continued from page* 82)

torque multiplication of the converter, which is used on an International Harvester Co. truck, is 2.2 to one. Drive is always through the converter.

Beier

This is an infinitely variable mechanical transmission. Power is transmitted through the edges of disks and the sides of disks—which are variable in relation to each other. It was developed in Germany and was used experimentally on the Volkswagen. An English manufacturer intends to install the device on buses.

Kreis

An entirely automatic transmission, it uses a series of overrunning and centrifugal clutches with a three speed gear box. It has been installed on foreign motorcycles and automobiles.

1951

Chrysler Torque Converter

Chrysler Corp. combined the M-6, 1948, hydraulically-operated transmission—minus the fluid coupling—with a four-element torque converter. Operation is the same as with the fluid coupling combination, except that low range is necessary only for extreme torque requirements. It is used on only two models of Chrysler automobiles. Stall torque of the converter is 2.34 to one. Drive is always through the converter.

MACHINERY NEWS

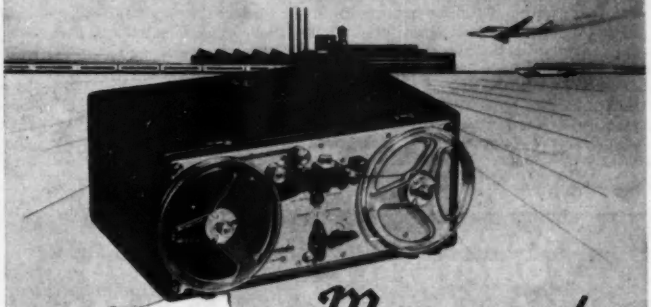
(*Continued from page* 54)

up with the idea of having the automobile producers make machine tools on a sub-contract basis. Not only was this contradictory to the recommendations of the machine tool people, but just how can two or more firms subsist on the present price stabilization measure under a joint sub-contract agreement? One deal between a large machine tool builder and one of the big three automobile makers has already fallen flat because of the foolish Government attempts at price control. The automobile makers are willing to do their part, just as they did in WW II. They have already advised the NPA of their willingness, but they also want a satisfactory clarification of present machine tool pricing policies.

Employment Up

On the brighter side, the Bureau of Labor Statistics reports that employment in the machine tool industry increased by approximately 50 per cent from July 1950 to March 1951. The total number employed as of March was more than 74,000 persons.

"SOUND" Research for a Better Product



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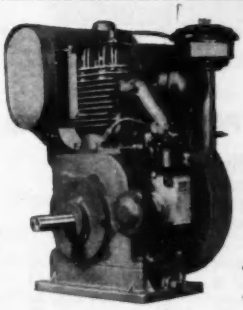


Four Single-Cylinder WISCONSIN Air-Cooled ENGINES Offering More POWER ADVANTAGE, 6 to 9 hp.

This series of single-cylinder models have all of the traditional Wisconsin heavy-duty features such as self-cleaning tapered roller bearings at both ends of the crankshaft, rotary-type, high tension OUTSIDE magneto operating as an independent unit, and maximum torque at all usable speeds.

CONDENSED SPECIFICATIONS

MODELS	AEH	AFH	AGH	AHH
Bore - - - - - - - - - inches	3	3¼	3½	3⅝
Stroke - - - - - - - - - inches	3¼	4	4	4
Disp. cubic inches - - - - - - - - -	23	33.2	38.5	41.3
H. P. and R.P.M. range - - - - - - -	3.9 at	6.0 at	7.2 at	7.7 at
	1600	1600	1600	1600
	6.1 at	7.2 at	8.4 at	9.2 at
	2600	2200	2200	2200
Net weight in lbs., Standard Engine - - -	130	180	180	180

Our engineering department will gladly cooperate with you in adapting Wisconsin Engines to your requirements. Write for detailed data and name of the nearest Wisconsin distributor.

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46 WISCONSIN

Concentration of Defense Contracts

(*Continued from page* 33)

ous other factors of similar importance.

The big part that subcontractors and suppliers play in the automotive industries is indicated by the fact that ordinarily in peacetime suppliers in the United States, generally small businesses, get over 50 per cent of the income received by automotive companies. Out of every dollar received for war orders by automotive companies in 1942, approximately 56 cents went to subcontractors and suppliers, of which 63 per cent were small businesses employing less than 500 persons. The historical pattern of subcontracting inherent in the automotive industries is being followed in the production of current war orders and thousands of subcontractors have already been selected.

General Motors, which has over 12,000 suppliers in peacetime and had 19,000 suppliers during World War II, has stated that as a basic defense policy it intends to subcontract as much as possible component parts of all defense products to dependable and competent subcontractors who have equipment that can be used to produce such parts. GM's Cadillac Motor Car Div., now getting into production of a light tank, has about 1400 outside suppliers and subcontractors.

Packard Motor Car Co. intends to double its number of suppliers as combined new car, marine Diesel engine, and jet engine programs are underway. Compared with 1100 suppliers who have served the company's automobile manufacturing needs, Packard estimates that 2500 suppliers will be required for the combined Packard programs.

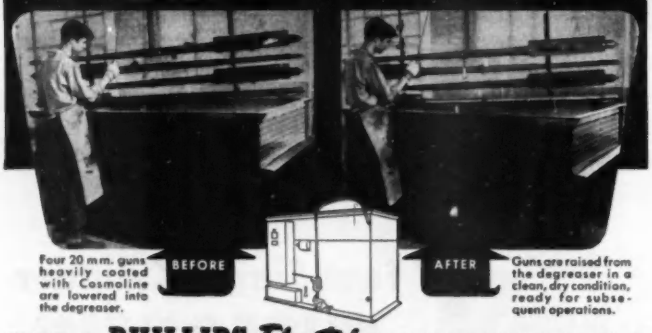
The Chrysler Corp. has disclosed that more than 1500 individual suppliers already have assignments, that an additional 2000 will be added soon, and as defense output is expanded this number will increase. During World War II, Chrysler had about 15,000 suppliers.

The Ford Motor Co. has 1636 subcontractors and suppliers for its Pratt & Whitney aircraft engine contract, and 64.7 per cent of these firms are small businesses. Ford has 791 subcontractors for its tank program, 76 per cent of which are small businesses.

Willys-Overland Motors currently has 2000 suppliers. The International Harvester Co. will subcontract between 80 and 90 per cent of the material it requires for present prime Government contracts. For example, International's armored utility vehicle program already has 327 subcontractors who in turn have 1337 subcontractors. The company has 219 subcontractors for its 6 x 6 truck contract. In both cases more than half of these are small businesses. For its war orders Studebaker suppliers are expected to run into the hundreds.

In order to acquaint potential suppliers and subcontractors the automotive companies have participated heavily in the various subcontracting clinics held under the auspices of the Armed Forces. Chrysler, for example, has participated in those clinics held in Atlanta, Ga.; Fort Worth, Texas; Cleveland, Boston and St. Louis. Ford and Nash have participated in the Chicago clinic, while Studebaker has participated in clinics held in Chicago, Boston, San Francisco, and Seattle, Wash.

COSMOLINE COATED GUN
COMPLETELY DEGREASED
IN LESS THAN 4 MINUTES



Four 20 m.m. guns heavily coated with Cosmoline are lowered into the degreaser.

Guns are raised from the degreaser in a clean, dry condition, ready for subsequent operations.

WITH A PHILLIPS *Electric* VAPOR DEGREASER

Here was a really tough metal cleaning problem. Cline Electric Mfg. Company, Chicago, had to remove Cosmoline from a large quantity of 20 mm. guns before going ahead with modification operations on the guns. Estimating that other cleaning methods would take about 2 hours per gun, Cline purchased a Phillips electric batch-type degreaser to handle the job. As a result sixteen guns are being degreased per hour *at a savings of 85% on cleaning costs per gun.* Cline reports that the degreasing operation thoroughly prepares each gun for subsequent operations.

Here is another instance of how Phillips degreasers cut manufacturing costs through faster, more thorough, more economical metal cleaning. If you have a degreasing problem, check with Phillips. Our engineers will be glad to recommend the right machine for your job from Phillips' complete line of standard degreasers.

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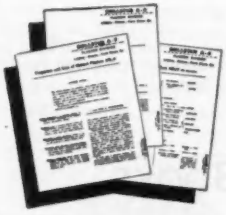
High dielectric strength of Plaskon Alkyd—more than 550 v./mil.—gives parts molded from it an important adeantage where high voltages must be restrained. Rotor switches and insulators for the Harman & Collins Magneto shown, molded of Plaskon Alkyd by Prisk Plastic Molding, Alhambra, Calif.

25,000 volts kept on the right path by a new plastic suitable for automotive applications!

It takes a plastic of unusual dielectric strength, arc resistance and dimensional stability to harness and keep a 25,000 volt output "on the right path." That's why Harman & Collins chose Plaskon Alkyd for insulators and rotors in its 8R-101 Magneto! Harman & Collins reports that "other plastic materials previously tried were completely inadequate for this application."

Plaskon Alkyd, developed by the Plaskon Division of Libbey•Owens•Ford, is a thermosetting plastic molding compound which offers the automotive industry unusual electrical and mechanical properties for better performance in finished products. It can be molded *faster* at lower pressures on conventional or fully automatic machines, utilizing less expensive dies.



We will gladly send you literature describing the many desirable properties of Plaskon Alkyd. Here is information which offers evidence that parts can be molded *better and faster, with lower tooling cost*—using Plaskon Alkyd.

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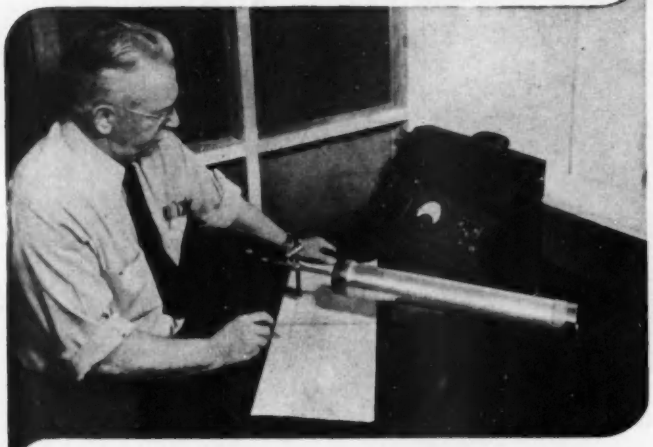

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Among the many precision products manufactured by Interstate Engineering Corporation at El Segundo, Calif., are hydraulic cylinders for aircraft assemblies.

The I. D. of these cylinders is honed and, prior to the use of the Profilometer by Interstate, it was believed that the only way to secure an acceptable surface finish was to remove all trace of hone marks. A ten microinch roughness rating was specified, but Interstate's Profilometer readings showed that their honing operations were producing a finish as low as four microinches. Reducing honing time by *half*, they found that they could still secure a perfectly acceptable finish—well within their customer's specifications.

This is only one example of how this well-known West Coast concern has been able to save time and money in production operations through the use of the Profilometer. In their case, it is considered a shop tool, being located immediately adjacent to the machining operations and in constant use for both production inspection and production supervision.

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PRC

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Instrument Manufacturers

ANN ARBOR 12 • MICHIGAN

Bus Per Hour

(*Continued from page* 35)

overhead electric hoist which travels on a curved track. In this manner the vehicle can easily turn the tight corner between the two assembly areas and go through subsequent operations longitudinally along the next assembly line. While the bus is being positioned in the next building, an overhead crane picks up the dolly just vacated by the bus and transfers it to station three—thus completing the dolly conveyor cycle.

Coaches on the second part of the three-section assembly line are secured to each other by a cable connected to a winch at the end of the line. Most operations along this section, stations 15 through 35, are performed on the interior preparatory to complete painting of the passenger compartment.

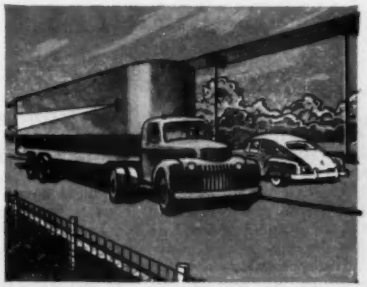
Where feasible, however, operations are carried on inside, outside, and underneath simultaneously to get as much work done as possible at each station. When the vehicle is positioned on a transfer table at the end of the second line, it has been completely painted inside and primed and masked outside.

Moving to the third and final section —on the transfer table—of the 2185-ft assembly line, the bus goes through a spray booth for the exterior finish of synthetic enamel. For drying this coat of enamel, ACF-Brill has set up several panels containing infra-red lamps. These panels are mounted on a merry-go-round type conveyor so that they move around the sides of the bus. Since there are no panels at two sections of the conveyor—to permit entry and exit of the vehicle—the enamel is alternately heated and cooled during the drying cycle. Another panel with infra-red lights traverses back and forth on a pair of overhead tracks for baking the roof paint. Automatic switches control the time cycle of the panels.

Buses along this final assembly section are also secured to each other by a cable so that the entire line moves as a unit. Subsequent operations finish off the interior, install glass and exterior trim, adjust various components, inspect the completed coach and prepare it for road test.

BOOKS . . .

PETROLEUM FACTS AND FIGURES, *Ninth Edition, 1950*, published by *American Petroleum Institute, 50 West 50th Street, New York 20, N. Y.* Price $2.50. The new edition—the first since 1947—embraces historical data reaching back to the early days of oil. In addition to the long-term series of tables on utilization, production, refining, marketing, transportation, prices and taxation, this edition contains a new series of tables on business, operating and allied statistics.



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Heavier vehicle loading means you move more materials with less manpower—less equipment—in less time. With Vickers Hydraulic Steering you can do this and also improve maneuverability and reduce operator fatigue.

Vickers Steering Booster on lift trucks, loaders, off-the-road trucks or any wheeled cargo mover supplies all the front wheel turning effort and absorbs all the steering shock. The heaviest vehicle steers as easily and precisely as a passenger car . . . provides for the extremely short turns and precision control in restricted areas which saves real time.

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

AIRBRIEFS

(*Continued from page 58*)

trol surface shapes, all in actual flight-test articles.

The Air Force has not ordered a prototype fighter plane since 1948 preferring, instead, to continue development work on existing types. This latter course offers short-term benefits to be sure but it is the brand-new airplane designs that are the milestones of a nation's aeronautical progress, not the piecemeal squeezing of performance ounces out of existing types.

Helicopter Airline

After nearly 10 years of dreams and predictions, the first U. S. helicopter airline is now a fact. The Civil Aeronautics Board has granted permission to Los Angeles Airways, pioneer helicopter mail line, to carry passengers over its local routes. The service will not actually begin until early next year due to the necessity for the airline to obtain passenger-type helicopters, and orders for two new eight-passenger craft have already been placed. The new service will offer passenger flights between the heart of downtown Los Angeles and Riverside, San Bernardino, Santa Ana and Pomona. Fares will range from $3.42 to $6.00 for these trips. First such service was offered briefly in England a year ago but it was finally terminated due to lack of business, but LA president Clarence M. Belinn believes strongly that the sprawling Los Angeles area will absorb quickly his present schedules and that more will be needed a long time into the future.

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The newest method for all filing operations gives better control without handle interference. The Over-Tang positions the file to give accurate operator control, and the precision V-block grips the tang accurately and securely. You drive it on—knock it off. Vertical wooden handle is steel reinforced—you use it like a carpenter's plane. Ruggedly made for efficient, long, hard use. Weighs about six ounces.
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No Jets in Sight

Eastern Air Lines, which has astonished the airline business of the entire world by operating profitably for 16 years without interruption, has announced the largest re-equipment program in airline history. Eastern has completed plans for the purchase of $100 million worth of new transport airplanes, including 30 Lockheed "Super Constellation" and 60 Martin 4-0-4 transports—but no jets. These new planes will replace 47 Douglas DC-3 and 26 Douglas DC-4 transports now in use. The 20 Lockheed Constellation transports now in service will be retained, giving Eastern the most modern transport fleet in the world. The Lockheed planes will cost $55 million, the Martin planes $40 million, and $5 million is being spent for new equipment and servicing facilities for the new aircraft. Financing of the program will be mostly out of pocket and is made up of a $30 million loan from 27 banks, $25 million already advanced on the purchase of the equipment and the remaining $45 million will come from cash on hand and future profits. Although none of these aircraft is to be jet powered, both the Super Constellation and the Martin 4-0-4 are designed for conversion to turboprop engines at a later date.

Pick and Choose

The U. S. Air Force, which heretofore has taken machine tools from its pools only for its major contractors, has announced a new plan under which any manufacturer holding a USAF contract may select machine tools from its two major pools at Marietta, Ga., and Omaha, Neb. The purpose of the move is two-fold, of course: in addition to providing badly-needed tools for small companies, the new program will also more rapidly clean out these two huge plants and speed their conversion to production facilities. Lockheed Aircraft Corp. will build the Boeing B-47 Stratojet bomber at the Marietta, Ga., plant.

(*Turn to page 102, please*)

EXTRA EMBEDABILITY

EXTRA ENDURANCE

EXTRA ECONOMY

DUREX-100
ENGINE BEARINGS

Increased embedability is the secret behind the greater endurance, the longer life, of Durex-100 engine bearings. And the matrix makes the difference. Yes, the matrix is the one important difference in construction. It is a feature—an exclusive Moraine feature—that makes a world of difference in performance, and in economy, too.

With Durex-100 bearings, embedability is not limited to the thickness of the babbitt overlay alone, as in conventional type bearings. It is provided by the depth of the babbitt overlay *plus* the much greater depth of the matrix.

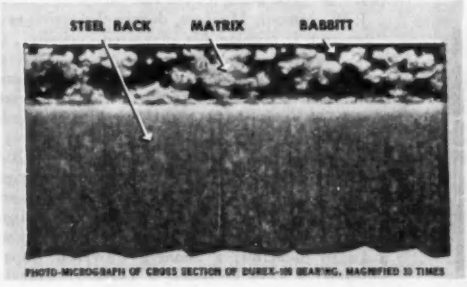


PHOTO-MICROGRAPH OF CROSS SECTION OF DUREX-100 BEARING, MAGNIFIED 30 TIMES

THE MATRIX MAKES THE DIFFERENCE

Steel-backed intermediate matrix of porous copper-nickel bonds mechanically, as well as metallurgically, with thin high-lead babbitt overlay.

Here's how the bearing is built. First, the steel back is covered with a layer of copper and nickel metal powders. Then, a sintering process is used to form a porous matrix integrally brazed to the steel back. A thin overlay of high-lead babbitt penetrates the porous matrix, bonds mechanically and metallurgically to the steel-backed matrix. This provides far greater embedability—provides greater protection against damage from large particles of foreign matter that can get into bearings.

Extensive testing and actual use have proved the superiority of Durex-100 engine bearings. They are used as original equipment on Cadillac, Buick, Oldsmobile, GMC, and other leading makes of cars and trucks. Let Moraine give you the full story on Durex-100 engine bearings—how they can be used to advantage in the engines you manufacture. Get the details from Moraine today.

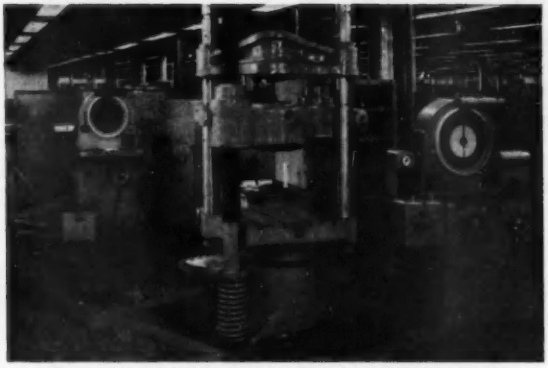
MORAINE PRODUCTS
DIVISION OF **GENERAL MOTORS**
DAYTON, OHIO

Durex-100 Engine Bearings by Moraine

INTERNATIONAL

This attractive structure, with 250,000 sq. ft. of floor space, houses 300 skilled craftsmen in its ten sections. Each section is devoted to some important phase of manufacturing research.

Sectional view of metallurgical laboratory, showing several laboratory rooms and a row of Baldwin-R. R. Moore and Baldwin-Sonntag testing machines.



Group of large testing machines in the laboratory. Foreground: 400,000 lb. capacity Baldwin B-T-E Universal Testing Machines. Background: Baldwin 600,000 in. lb. Torsion Testing Machine.

Research worker setting up a product component in a Baldwin B-T-E Universal Testing Machine.

Progressive management's recognition of the importance of testing and research in keeping its products ahead is dramatically illustrated by International Harvester Company's program. Established at a cost of $4,000,000 and recently expanded with an additional $1,000,000 investment, the facilities permit parts and materials to be scientifically studied, a minimum of time and effort expended and material that has "gone along for the ride" to be eliminated.

J. W. Armour, Manager, defines the activities as "Research is nothing but organized curiosity . . . and Manufacturing Research is nothing but an organized inquiry into the facts of our industrial life." Baldwin Testing Equipment plays an important part in implementing the varied activities. It includes a 60,000 lb. and a 400,000 lb. B-T-E machine; a SF-01-U, a SF-1-U, a SF-10-U and two SF-20-U fatigue testers; a 10,000 in. lb. rotating beam fatigue machine, four R. R. Moore fatigue machines; a 10,000 lb. capacity Ford-type Baldwin fatigue machine; a 600,000 in. lb. torsion testing machine; a Lazan oscillator; a Sonntag Universal Impact Machine; a SR-4 Recorder; a Type "L" Portable Strain Indicator; three Type "K" Portable Strain Indicators; a 48-point scanning and recording unit, and a stock of SR-4 gages.

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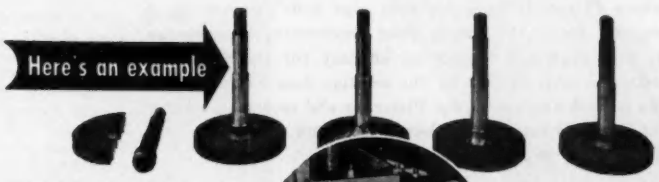
BALDWIN-
TESTING

HARVESTER satisfies its "Organized Curiosity"

· with the aid of *BALDWIN* equipment

Here's an example

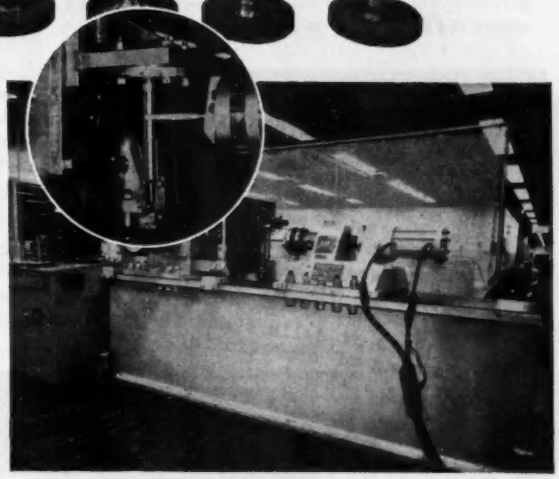


FINDING THE FACTS QUADRUPLED THE LIFE OF THIS PART

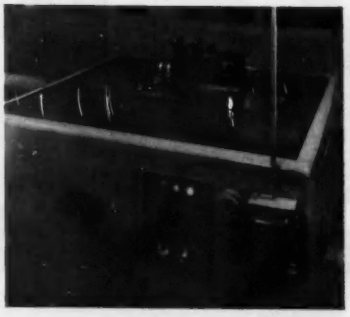
Here is a specific example of how manufacturing research paid off in product improvement—and production savings.

The drive shaft illustrated above drives a working mechanism. It consists of a flange or head plate welded to a step-type shaft. Field failures occurred when shafts twisted off at the key-way. A switch to alloy steel, plus heat treatment to improve physicals, eliminated this weakness . . . but failures occurred at the center of the weld metal. Next projected step called for an increase in size of shaft —which would involve major design changes, increased machining and added material. The problem was then turned over to Manufacturing research.

Loads were applied to various specimens, and stress concentrations plotted. Test pieces are shown above. From left to right, (1) field failure of original design. (2) Original design-tested in Baldwin SF-20-U machine. Failed at junction of shaft and weld. (3) Test shaft machined from forging, leaving extra metal on base. Failure occurred at bearing shoulder. (4) Experimental shaft with ½" radius at flange and ⅛" radius at collar. Failed in weld after 500,000 cycles. (5) Present design. Stress at bearing shoulder eliminated by equalizing diameter at both sides of collar and distributing junction stress with large radius. Design failed after 2,020,000 cycles. Problem solved without adding extra material, or altering other machine components.



Baldwin-Sonntag SF-20-U Fatigue Machine, and (insert) test set-up to apply simulated service test to drive shaft. Final design withstood over 2,000,000 cycles before failure.



Baldwin-Sonntag Fatigue Testing Machine . . . one of several in the laboratories.

• • •

Literature on any of the Baldwin Testing Equipment mentioned will be sent on request. Just write, indicating your particular interest.

LIMA-HAMILTON

HEADQUARTERS

Eddystone Division, Baldwin-Lima-Hamilton Corp., Philadelphia 42, Penna.

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MOTOR WHEEL CORPORATION

LANSING 3 MICHIGAN

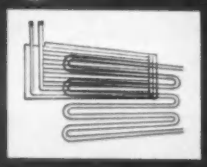
finds **PLATECOILS** more efficient – require 90% less cleaning

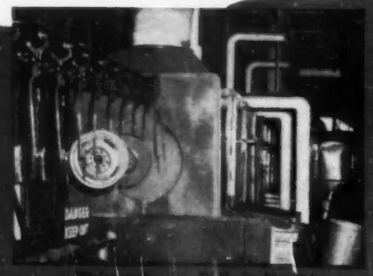
The advantages of Platecoils for tank heating and cooling make themselves felt in many ways. An example is the Motor Wheel Corporation, where Platecoils have replaced pipe coils for heating a bonderite washer. Mr. C. V. Lovell, Chief Draftsman, Maintenance Department, says Platecoils "are more efficient for the following reasons: "First, the scale formed by the solution does not adhere as readily to the smooth surface of the Platecoils and secondly, a large percentage of the scale that does collect is flaked off. Naturally this allows the Platecoil to be a better heat conductor . . ."

HOWEVER, THE GREATEST SAVING seems to be in the amount of time consumed in cleaning the coils. The pipe coils were cleaned every thirty days by the hammer and chisel method and required about five man hours per coil, including removal and replacement time.

The Platecoils are cleaned by brushing every sixty days and require about one man hour per coil including removal and replacement time.

In terms of dollars and cents this amounts to a saving of approximately $7.20 per coil per month . . ."





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Cleaned and Repaired Without Dumping Tank Solution
Greater BTU Transfer Per Unit Area
Weighs Only Half as Much as Pipe Coil
No Threaded Joints in Tank
Increased Tank Capacity
Fast, Easy Installation
Easy to Clean

PLATECOIL
Division
KOLD-HOLD MFG. CO.
LANSING 4, MICHIGAN

Jet Engine

(*Continued from page 72*)

lathe onto the bed of this Heald No. 174 internal grinder, the recessing or chamfering can be done without removing the piece from the chuck.

Because these thin-walled rings are very light, and the cuts to be taken in the second operation are so slight, this method of using only one setup is attractive in giving greater accuracy by keeping all the cuts concentric and in reducing setup time.

Turning out parts in production quantities for an engine that is still in the semi-production stage calls for a high degree of flexibility of tooling. This was the problem faced in producing compressor and turbine disks for its new engine designs—a large number of disks of various sizes, still subject to design changes.

The turret lathe's flexibility, combined with its more or less "permanent" tooling, seemed the obvious answer to this requirement, provided that it could be combined with plenty of rigidity for easy machining of heat-resisting alloys with carbide tools. Pratt & Whitney Aircraft tool engineers suggested to Jones & Lamson that a heavy, flat sliding-head turret carrying an abundance of tool-holding screws be incorporated in a modern design of heavy-duty turret lathe. The result is the rugged J & L 10-B cross-sliding turret lathe.

Extra support for the tools as they cut is obtained by means of the hardened steel plate which spans the gap in the carriage, abutting against the base of the small four-way tool post. On this plate "ride" the hardened steel bolts that project from the lower part of the toolholders on the large six-way turret. This gives maximum rigidity to the cutting tools, since there is, in effect, no overhang of the turret.

A large number of tool-holding screws is provided on the turret, strategically placed so that a wide range of tools can be mounted. The flexibility of the turret lathe can thereby be fully realized.

The single point tools are positioned in the holders by templates corresponding to the contour of the disk to be cut. Using an assortment of templates, it is possible to machine 16 different sizes of disks on both sides. Not all the tools for this range of sizes can be set up on the turret at once, of course, but it will handle at one time all the tools for machining both sides of two sizes of disks. Several tools can be used to remove metal simultaneously, in plunge cutting the forgings from which compressor and turbine disks are made.

Resort to machines with this degree of flexibility will be mandatory, in Pratt & Whitney Aircraft's view, until the production-quantities called for reach much higher levels and warrant more specialized single-purpose machines.

Forming tank halves on a Clearing press at Lockheed.

MISSION for Mass Production

To extend the range of jet fighters, wing fuel tanks have been developed to be dropped when empty. Two tanks are lost on every flight, so quantity production at low cost is imperative. Lockheed Aircraft Corporation turned to Clearing for a special hydraulic press to solve this problem. These expendable tanks are now being produced as required.

Providing the means to produce large quantities of metal items at low unit cost has been Clearing's chief concern since the company was founded. Parts even larger than shown here, and other parts tiny by comparison, are being turned out economically on Clearing presses today. It will pay you to consult Clearing with your problems.

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CMC CLEARING

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

Mercedes Starts Production Of Two New Passenger Cars

SUPPLEMENTING the passenger cars and trucks produced soon after the war, Mercedes-Benz is going into production of two new high-priced models, the 300 and the 220 with six cylinder, valve-in-head engines of respectively 183 and 134 cu in. displacement. The 300 model is on a 120 in. wheelbase chassis and the smaller 220 has a wheelbase of 112 in.

The larger engine is almost square, with a bore and stroke of 3.34 by 3.46 in., and has a chain driven overhead camshaft with large diameter valves in a light alloy head. There is an oil heat exchanger which makes it possible to use SAE 10 oil throughout the year, and oil is squirted onto the cylinder for efficient lubrication when the engine is cold. Output of this engine is 115 hp, and maximum speed of the car, which weighs 3710 lb, is stated to be 96 mph.

Chassis layout follows that of earlier Mercedes-Benz models with tubular oval-section rails, splayed at front and rear, and united by circular-section tubular members. Independent coil spring suspension is used front and rear, with hydraulic shock absorber in the axis of the springs at the front and inclined at the rear. In addition to this there is a supplementary torsion bar suspension which can be brought into action by the use of an electric motor when carrying full load, and which changes the deflection rate from about one in. to 0.7 in. per 100 lb. Another new chassis feature is a hydraulic shock-absorbing mechanism built into the steering gear. This is a telescopic shock absorber connected to the frame at one end and to the three-piece steering linkage at the other. This damps out reactions caused by the road surface.

The 300 Mercedes-Benz is being marketed as a four-door sedan and a four-door convertible for five persons. It features new body styling, a one-piece curved windshield, a large curved rear window, headlights recessed in the fenders, and speed change lever under the two-stroke steering wheel.

The 220 model is generally similar to the other car, Its engine has a bore and stroke of 3.12 by 2.84 in. and an output of 80 hp with a compression ratio of 6.5 to 1. All four speeds are synchronized. Weight of the chassis is 2024 lb, and that of the sedan 2915 lb.

An addition to the utility vehicle section is the all-purpose UNIMOG, a four-wheel drive agricultural tractor with six forward speeds and two reverse ratios, powered by a Mercedes-Benz four cylinder Diesel engine running at 2500 rpm. This is a short wheelbase tractor (67 in.) with an all-metal cargo body, having power take-off both front and rear and belt pulley drive on the right-hand side. The rear coupling has been designed to take all kinds of agricultural implements. Front wheel drive can be engaged or disengaged while running, without the use of the clutch. Suspension is by coil springs front and rear, with hydraulic shock absorbers. Weight is about 3700 lb, and the speed range is from two to 32 mph at the governed engine speed of 2500 rpm. In addition to supplying the home market, it is stated that this all-purpose tractor will be exported in quantities to South Africa and South America.

Illustrations of the Mercedes-Benz Model 300 sedan, engine, and rear suspension appeared in the May 15 issue of AUTOMOTIVE INDUSTRIES, page 40.

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Engine performance not only influences *today's* customers, it also builds a reputation which effects *future* sales. Thus, it is doubly important to specify engine components that will maintain your standards of quality and service. In carburetors that means Stromberg.

Exclusive design features, and mechanical simplicity have made Stromberg* Carburetors famous for *lasting performance*. Judge on the basis of *long-range economy* and you will agree—Stromberg Carburetors are the logical choice.

*REG. U.S. PAT. OFF.

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5 o'clock Stampede

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In industry after industry, R/M friction materials serve today in applications that vary from brake blocks for heavy trucks to tiny parts for phonograph turntables.

This wide range of service provides a breadth of experience that can be most helpful to you, no matter what your requirements in friction materials. Your R/M representative can work from samples, from designs on paper, or from figures on horsepower development combined with desired performance characteristics. When you call him in, you summon all the facilities of the world's largest supplier of friction materials, with four plants, four research departments, and four testing laboratories.

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HIGH IMPACT PLASTIC

Ideal for molded parts that take a beating, ACE-HIDE is a new rubber-base material with unusually high impact strength and chemical resistance. Typical applications are trays, tote boxes, utensils (the abused acid pail above, for instance), carrying cases, golf bag tops (below), seats, etc., etc., etc.

ACE-HIDE is essentially rubber compounded with styrene copolymer resins. Tough, resilient, its rigidity in molded parts can be varied to suit your job either by altering the compound or by adding stiffening ribs. Takes inserts well. Surface is smooth, shiny. Does not develop flexing cracks, and ages well. Ace molding facilities offer wide range of sizes and shapes.

These properties suggest applications to you?	
Specific Gravity	1.05-1.40
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Durometer Hardness, D	42-68
Dielectric Strength, 60 cycles, v/mil	Up to 500
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100th ANNIVERSARY

American Hard Rubber Company

93 WORTH STREET • NEW YORK 13, N. Y.

Rolls-Royce

(*Continued from page* 51)

gears and flywheel can be at either end, to allow of accessories being fitted to the left or right side.

The six cylinder engine in its supercharged form develops 190 hp at a governed speed of 1800 rpm, maximum torque being 600 lb-ft at 1300 rpm. With cast iron cylinders the dry weight is 2480 lb. Crankcase and cylinder block are in one casting with easily replaceable wet cylinder liners. There are two separate cylinder heads, one for each three cylinder bores. Valve seats are replaceable, and seven main bearings of the steel-backed shell type support a nitride-hardened crankshaft. The main bearing caps are additionally stiffened by transverse bolts. Valves are mounted vertically in the head and operated by push rods and rockers from a camshaft in the crankcase. Pistons are light alloy with three compression and one oil ring, and the forged connecting rods are rifle drilled to provide for pressure lubrication of the piston pins.

The supercharger (optional) is of the Roots type and is mounted on the side opposite to that of the fuel-injection pump and driven through a spring drive from the timing gears at twice engine speed. Boost is about eight psi at maximum governed speed.

While the normal system provides for lubricating oil in the crankcase, the dry sump system is available for certain services. Full pressure lubrication is employed with reduced pressure for the overhead valve gear. A feature is a heat exchanger consisting of three pairs of tubes through which the oil is passed, these tubes being surrounded by the engine coolant. When starting from cold, the cooling radiator is by-passed and the coolant recirculated through the heat exchanger and cylinder jackets until a temperature of 70 C is attained. An automatic thermostatic control then allows the coolant to circulate normally through the radiator. The fuel injection pump is mounted low down on one side of the engine and incorporates a diaphragm fuel-lift pump. A 24-volt starter is standard and the 24-volt generator is driven by twin V belts.

A separate oil engine division has been erected near the main Rolls-Royce works at Derby and a few of these engines, known as the C range, have been delivered for installation in the Vicker-Armstrong crawler tractor, but full flow production will not be until early next year.

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SPARKLE plus

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ALCOA

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No salt shaker stickiness for users of Du Pont Motor System' Cleaner. Alcoa Aluminum Foil, laminated to cardboard, bars moisture-vapor absorption—keeps these efficient auto radiator granules free flowing, prevents caking in the carton.

Beyond protection, this sparkling aluminum wrapper* spotlights the package on dealer's shelves—adds lustre to a name long famous for adherence to highest product standards.

Because of its many possible applications, leading manufacturers—*in many fields*—have found Alcoa Aluminum Foil the answer to their packaging problems. ALUMINUM COMPANY OF AMERICA, 1765H Gulf Building, Pittsburgh 19, Pennsylvania.

*Wrapper by Allegheny Label Company

ALCOA ALUMINUM

Observations in Europe

By Joseph Geschelin

ALTHOUGH our own economy and political thinking have been geared to a war program of immense proportions, there is little evidence of a corresponding activity in Europe, at least to the itinerant tourist in his contacts with ordinary people. In England and France where economic stability depends upon a flow of exports in return for gold and dollars, the emphasis is clearly upon a maintenance of a civilian economy largely for export, although the man on the street accepts austerity and strict rationing without complaint.

One of the major problems in England, from the standpoint of manufacturing plants, is that of labor productivity. It still remains a matter for education by government agencies, a matter of proving by evidence on the record that the prosperity and security earned by labor in the USA is based upon high standards of labor productivity. Apparently some progress may be made as a result of the studies of the productivity team which recently toured this country.

In France, judging only by the writer's visit to the Renault plant, workers have a better appreciation of productivity. For example, in the extensive foundry operations at Renault—molding, core making, and related operations were being carried on at a pace quite comparable to that in our own foundries.

Although materials shortages are a plague in Europe, there is certainly plenty of aluminum. On heavy duty truck models built by Vauxhall, aluminum is being used in the transmission case, flywheel housing, and various covers. From an economic standpoint this has reduced the gross weight sufficiently to permit over-highway operations at 30 mph instead of the 20 mph limitation on conventional trucks imposed by government regulations.

American-made machine tools, the standard of the world today, are found in all the major plants and make an American observer feel quite at home. However, manufacturers are finding it difficult to acquire new equipment from the USA and now must seek other sources. Renault has won recogniton as an outstanding builder of transfer machines for its own use and is now engaged in the installation of standardized transfer units of radical design intended for building the new Fregate model.

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Size? Type? Drive? Torque? Engagement? Overload? Pick-up? Shock? Slippage? Vibration? Grabbing? Chattering? Mounting? No matter what your power transmission problem, there is a ROCKFORD CLUTCH that will solve it. Rockford clutch engineers are in a position to specify a size and type clutch that will meet your needs exactly. Send a print, with a description of your clutch problem, for their specific recommendation.
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BORG-WARNER
315 Catherine Street, Rockford, Illinois

ROCKFORD CLUTCHES

AIRBRIEFS

(*Continued from page* 90)

Natural Link

Kaman Aircraft Corp. has received a Navy contract for an investigation of the application of the gas turbine engine to the helicopter, the company's proposal being selected from those submitted by a number of helicopter manufacturers. The engine to be used is the Boeing 502-2, in which the Navy has long been interested. This engine is a turboprop weighing only 140 lb but delivering about 220 hp. The combination of the turboprop engine and the helicopter rotor is a natural one since both are essentially constant rpm machines without the necessity for rapid acceleration or deceleration. The design problem facing Kaman is the provision of enough air for operation of the gas turbine compressor at the low forward speeds of the helicopter. Kaman believes that the turboprop engine will eliminate the need for centrifugal clutch mechanism and cooling fan complexities and provide an all-around simplification of the helicopter engine installation problem.

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80Bxx, 81Bxx and 94Bxx Steels

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Maximum hardenability in very low alloy steels, with dependable uniformity of results, is assured by the addition of Grainal alloys.

The use of Grainal alloys promotes maximum hardenability with minimum amount of boron. The possibility of obtaining undesirable effects resulting from over-treatment by boron is avoided by the action of other elements of Grainal alloys in combining with oxygen and nitrogen and permitting full utilization of the low boron content.

More than a million and a half tons of steels made with Grainal have proved the superiority of these alloys in producing maximum hardenability.

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THE BEST MACHINE and the finest operator cannot do the best work without that irreplaceable essential — the *right* cutting fluid. Seldom is there more than one cutting fluid that is exactly *right* for the job — with which it may be done faster and better, or both.

Stuart combines theory and practice to give you the right cutting fluid for the job. Here is an example:

In a large gear department, cutting fluid tests were run on Gleason Revacycles cutting 8620 gear stock, 179 Brinnel hardness.

	"X" Oil	Stuart's SPEEDKUT "A"
Gears Per Tool Grind	1200	3200
Stock Removal to Recondition Cutters	.009"	.0035"
Price of Cutting Oil	33c/gal.	35c/gal.

There's a story! More production because of less downtime. Longer cutter life because of fewer grinds and less stock removal per grind. A lower *actual cost* for the cutting fluid.

You can get help like this from a Stuart Representative. Ask to have him call.

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Use The Right Cutting Fluid

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2733 S. Troy St., Chicago 23, Illinois

NEW PRODUCTS

For additional information please use coupon on page 60

(*Continued from page* 64)

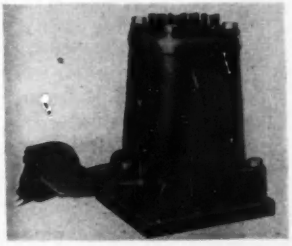
gravity electrolytic; and the Pormax plastic separator.

The Silvium alloy grid was created to minimize the problem of grid corrosion due to overcharging. Silvium's companion development, the new active material, is said to contain ingredients which react more effectively with electrolyte. The Ultra Start uses an electrolyte with a specific gravity of 1.260. Fourth major component of the battery is the Pormax plastic separator. It is said to be highly acid resistant, highly porous and non-brittle.

Other features of the battery are plastic connector shields, element protectors, plastic vent plugs of improved design, a vibration-proof sealing compound and a shock-resistant container. The bright crimson connector shields cover the intercell connectors to prevent short circuits caused by tools or other metal objects placed on top of the battery. Rectangular slots cut in the shields provide access for voltage checks with instruments commonly used for this purpose.

Element protectors are perforated sheets, which cover the plates of each cell element to prevent possible damage when a hydrometer syringe is inserted into the cells.

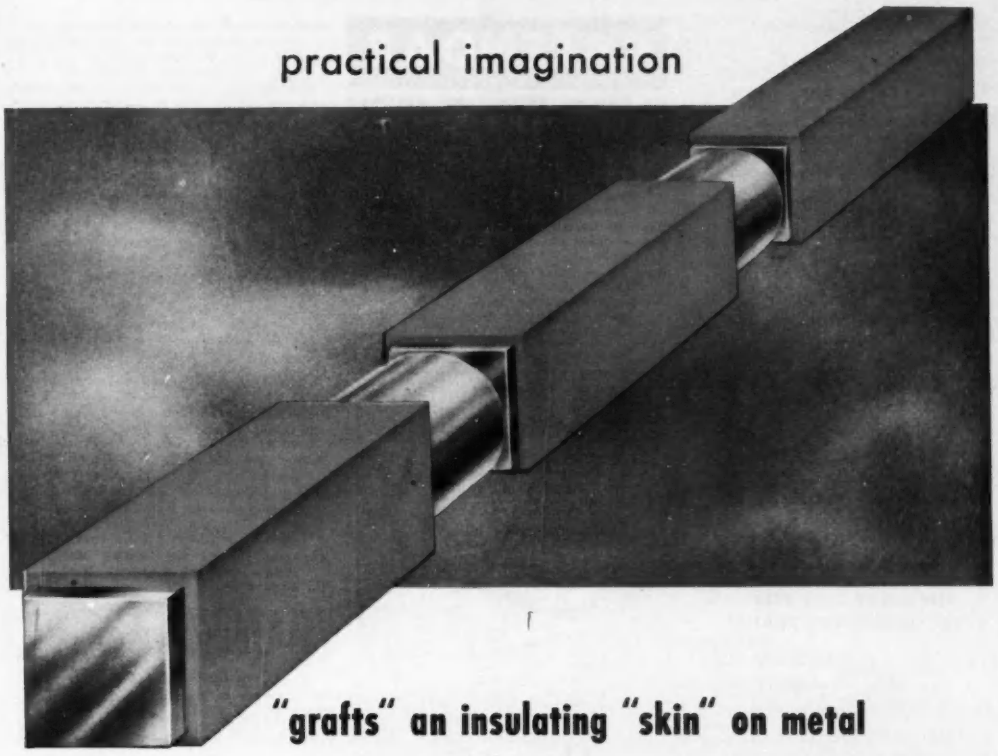
F-45—Foot Operated Air Valve



Quick-As-Wink foot operated valves, manufactured by C. B. Hunt & Son, Inc., Salem, Ohio, permit hammers, shears, presses, hoppergates, furnace doors, and all other types of air operated machinery and equipment to be fully controlled simply by foot pressure on a pedal, thereby freeing both hands of the operator. Valving mechanism has a stainless steel body and push-pull rods, brass sleeves, and self-sealing U-shaped packers. All operating parts are enclosed against entrance of dust and dirt. There is no metal seating. All parts are in pressure balance, eliminating creeping and crawling. Pipe connections are made conveniently through top of the housing.

(*Turn to page* 108, *please*)

practical imagination



"grafts" an insulating "skin" on metal

Here is another example of the practical imagination C-D engineers can put to work to solve your problems. In this case a heavy electrical connector had to be covered with a safe, efficient insulation. The material best suited to do the job was C-D Dilecto.

The next requirement was to make this insulation an integral part of the whole piece. Here is where practical imagination went to work. The solution was to laminate and mold the Dilecto directly on the metal bar.

When you have a problem involving plastics—whether it is simple or complex—be sure to check with C-D engineers for a practical, unbiased recommendation. They can choose the material best suited to your needs from a wide range of grades of five basic plastics to give you any combination of mechanical, electrical or chemical characteristics. A call to your nearest C-D office will bring you this kind of help any time—all the time.

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MICABOND (Bonded Mica Splittings)

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CALENDAR

OF COMING SHOWS AND MEETINGS

Conventions and Meetings

First European Machine Tool Exhibition, Paris .....Sept. 1-10
Berlin Automobile Show, Berlin, Germany .....Sept. 6-16
SAE Tractor and Production Forum, Milwaukee, Wis. .....Sept. 10-13
Sixth National Instrument Conference and Exhibit, Houston, Texas Sept. 10-14
Second Conference on Industrial Experimentation, Dept. of Industrial Engineering, Columbia University .....Sept. 17-21
American Society of Mechanical Engineers (fall meeting) Minneapolis, Minn. .....Sept. 25-28
Nat'l Metal Trades Assn., Chicago, Ill. .....Sept. 26-28
Sixth Annual Industrial Packaging and Materials Handling Exposition, Cleveland, Ohio .....Oct. 1-4
Paris Automobile Show, Paris, France .....Oct. 4-14
SAE National Aeronautic, Production Forum, and Display, Biltmore Hotel, Los Angeles, Calif.....Oct. 3-6
36th International Motor Exhibition, London, England .....Oct. 17-27
National Metal Congress and Exposition, Detroit, Mich.....Oct. 15-19
SAE National Diesel Engine Meeting, Drake Hotel, Chicago, Ill...Oct. 29-30
SAE National Transportation Meeting, Knickerbocker Hotel, Chicago, Ill. .....Oct. 29-31
AGMA Semi-Annual Meeting, Edgewater Beach Hotel, Chicago, Ill. Oct. 29-31
SAE National Fuels and Lubricants Meeting, Drake Hotel, Chicago, Ill. .....Oct. 31-Nov. 1
American Petroleum Institute (31st Annual Meeting), Chicago, Ill. Nov. 5-8
American Society of Mechanical Engineers (annual meeting)..Nov. 25-30
Ninth Annual Pittsburgh Diffraction Conference .....Nov. 29-30
Motor and Equipment Wholesalers Ass'n. (Annual Convention) Chicago, Ill. .....Dec. 5, 6, 7

1952

SAE Annual Meeting, Detroit, Mich. .....Jan. 14-18
Society of Plastics Engineers, Inc. (eight annual technical conference), Chicago, Ill.....Jan. 16-18
Pacific Automotive Show, Los Angeles, Calif. .....Feb. 28-Mar. 2
American Society of Lubrication Engineers, Seventh Annual Meeting and Lubrication Show Cleveland, Ohio .....Apr. 7, 8, 9
American Society for Testing Materials (annual meeting) New York City .....June 23-27

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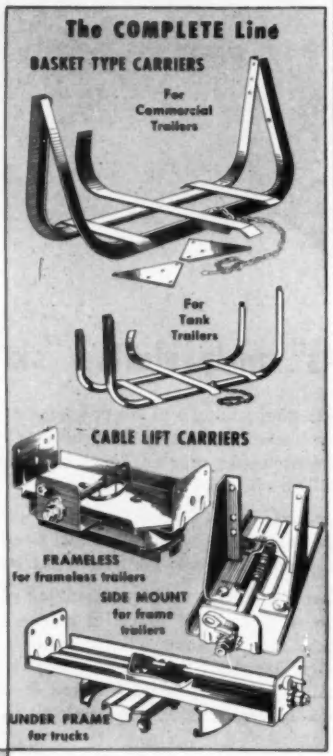
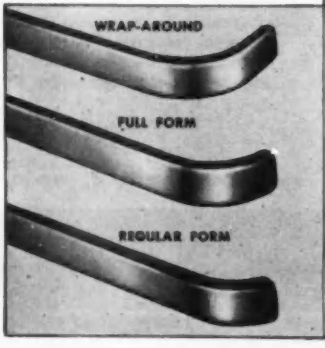
THE RIGHT TYPE FOR EVERY TRUCK AND TRAILER

From the complete Nash line you can choose exactly the right types and sizes of tire carriers for your trucks and trailers. All Nash Tire Carriers handle tires easily and carry them securely in transit. Light in weight, rugged and durable, Nash Tire Carriers are top values both as original equipment and for replacement installation. Easy to install.

See Your Equipment Supplier or Write Direct For The Nash Tire Carrier Bulletin





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Custom built for trucks, truck bodies and buses from high tensile steel. Choose from three styles and five face widths. Write for descriptive folder now.

NASH BROS. COMPANY

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PUBLICATIONS

(*Continued from page 60*)

D-58 Gages

Republic Gage Co.—Now available is Catalog 51 which contains information on the company's line of thread, plug, and ring gages.

D-59 Flexible Shafts

Elliott Mfg. Co.—Flexible shafting for power transmission is the subject of Circular 207. Speecifications and uses are given.

D-60 Machine Tools

Carl Hirschmann Co. — An eight-page booklet describing a Swiss precision machine developed by Thommen S. A., Waldenburg, Switzerland, for cold rolling threads, is now available.

D-61 Conveyors

Samuel Olson Mfg. Co., Inc.—Various types of material handling conveyors are described and illustrated in publication 1000A.

D-62 Cutting Tool

Crobalt, Inc. — The limitations and fields of application of Crobalt cast alloy cutting tools are discussed in a new bulletin, 101.

D-63 Bar Machine

The Cleveland Automatic Machine Co.—Model AB Dialmatic single spindle bar machine is described in an eight-page pamphlet. Its features and specifications are listed.

"EAGER BEAVER" Army's newest six-by-six. Built by Reo Motors Inc., Lansing, Michigan. Lives up to its name by hauling a full pay load up 60° grades . . . traversing rivers and streams with its engine fully submerged. The South Wind "978" introduces fresh air to keep windshields completely frost-free, cab and personnel comfortably warm.

NEWEST MILITARY VEHICLES CONQUER SUB-ZERO COLD

Reveal Details of Revolutionary New Heating Development for Army

Now ready to roll. Specially equipped to keep rolling under the severest weather conditions! These new Army vehicles boast increased personnel comfort, greater efficiency in sub-zero cold—all the results of an amazing new military heater: the South Wind "978."

Simplified in design. Compact. This rugged forced air heater preheats, heats, and defrosts in any type of military vehicle—in temperatures as low as 70° below zero. Dependably safe because the combustion air system is completely separated from the ventilating air stream. Always fast acting because warm air circulation doesn't depend on engine heat.

Built to Army Ordnance specifications, the "978" has been standardized by the Army for its winterization program. And because of its many exclusive advantages, promises to be influential in fashioning future designs for commercial car heating, too.

ACT NOW: Find out how this revolutionary new "978" military heater can effectively answer *your* vehicle heating and engine pre-heating requirements. Get the experienced counsel of a trained field engineer. Wire, write or phone Stewart-Warner Corporation, South Wind Division, 1514 Drover Street, Indianapolis 7, Indiana. Do it today.

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PERSONNEL HEATING *South Wind*
ENGINE AND EQUIPMENT PRE-HEATING
WINDSHIELD DEFROSTING

12 WHEELED eight ton heavy duty cargo carrier. South Wind "winterized." A "978" heater keeps frost off the windshields . . . freezing cold outside the cab.

SELF-PROPELLED artillery. New M 41 Motor Carriage with 155 mm. Howitzer. Equipped with two South Wind "978's" for personnel heating, and for heating gun components.

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Overcome Those Production Problems Blocking YOUR Line

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JERVIS B. WEBB COMPANY

POWER and FREE CONVEYORS

Proven through constant use in hundreds of manufacturing plants, Webb Materials Handling Conveyor Systems reduce costs and increase efficiency and productivity.

Power and Free Conveyors can be tailor-made to your requirements . . . to any plant large or small. They offer complete flexibility in meeting production problems. Some of their advantages include:

- Loads are *pushed*, rather than *carried*, on Webb "Power and Free Rail" conveyors.
- Manual or automatic switching of loads either *from* or *to* the main "Power" line.
- Loads may be lowered vertically from the "Power" line . . . anywhere along the route.
- Automatic dispatching of loads to distant points by presetting carriers for a given destination.
- Accumulation of loads for "banks" by gravity from "Power" line to "Free" line eliminates floor storage space waste.
- Momentary stopping of loads anywhere along the route, by disengaging "Free" trolleys from "Power" pushers.

Remember—You can depend upon Webb Engineering and cost-cutting Conveyor Equipment to solve your materials handling problems.

CONVEYOR ENGINEERS AND MANUFACTURERS

JERVIS B. WEBB COMPANY

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OFFICES IN PRINCIPAL CITIES

NEW PRODUCTS

For additional information please use coupon on page 60

(*Continued from page* 104)

F-46—Surface Grinder Improved Components

The DoALL Co., Des Plaines, Ill., has recently adopted a new type hydraulic cylinder and piston assembly to power the tables of DoALL hydraulic surface grinders.

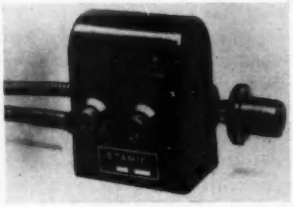
On the hydraulic longitudinal table drive, brass cylinders have been replaced with precision-honed steel cylinders. Instead of neoprene cups, the new piston assembly includes three matched automotive-type piston rings, designed to provide smoother table feeds and practically eliminate maintenance on this assembly.

The packing gland has been changed from a fixed to an adjustable type. The cylinder drive rod is a floating type that allows the table to ride on its accurately scraped ways without interference from the drive.

The saddle, or cross feed table movement is also completely hydraulic, and uses the same automotive-type piston rings as mentioned for the piston assembly. The cross feed cylinder can now be repacked without dismantling the grinder.

Through a design change in the custom built combination valve, operating pressure can be reduced by approximately 30 per cent, said to result in longer life for all parts of the hydraulic system, and smoother, quieter operation.

F-47—Pneumatic Micrometer

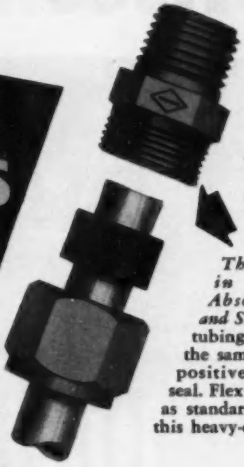


Etamic, a pneumatic micrometer with a sensitivity of four micro-inches, has been placed on the market by Ateliers de Normandie, Paris, France. Made for installation on various machine tools, it operates at a pressure of over 60 psi. A diaphragm is the only moving part in the device which is based on the differential principle. Automatic calibrating and feed-disengaging as well as inspection and measuring are some of the applications for which this unit can be used.

(*Turn to page* 114, *please*)

Got a tough tubing connection job?...

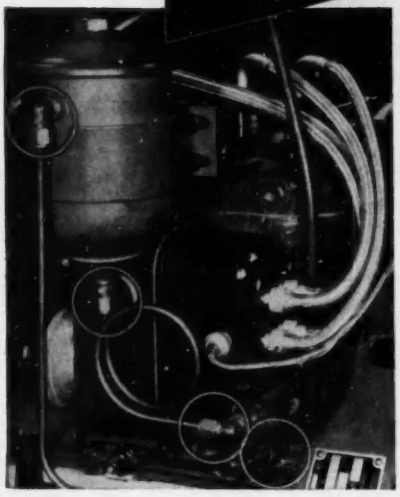
IMPERIAL FLEX FITTINGS May Be the Answer

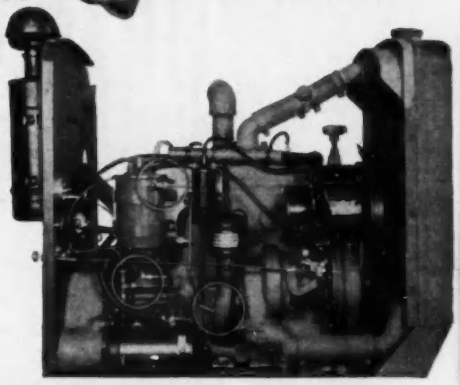


The tube coupling with vibration and shock absorbing sleeve.

This Elastic Sleeve in Flex Fittings Absorbs Vibration and Shock . . . permits tubing to flex and at the same time assures a positive pressure tight seal. Flex Fittings are used as standard equipment on this heavy-duty engine.

Flex Fittings make joints virtually indestructible by VIBRATION . . . withstand SHOCK and MINOR TUBE MOVEMENT





Flex Fittings, circled on this engine, are very easy to install . . . simply slip nut and Flex sleeve over tubing . . . insert tubing into body as far as it will go and tighten nut—that's all.

Whether it's earth movers (illustrated), tractors, diesel engines, heavy power equipment or machinery, Flex Fittings will do the job. They have been thoroughly proved by extensive use.

Flex Fittings Can Be Used With All Kinds of Tubing

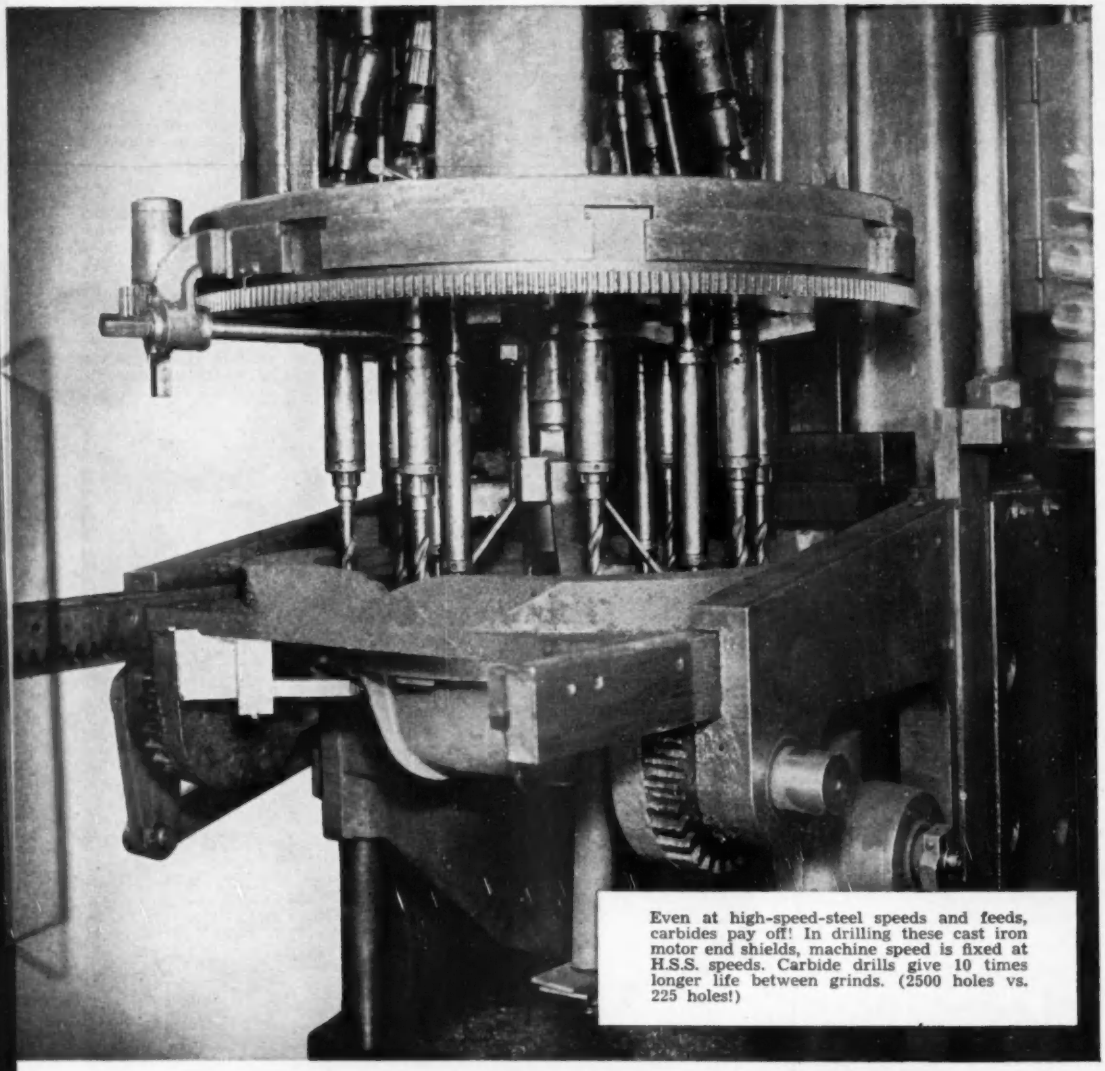
Imperial Catalog 344 gives you complete information on Flex Fittings. Ask for your copy.

THE IMPERIAL BRASS MFG. CO., 1241 W. Harrison St., Chicago 7, Illinois

IMPERIAL

PIONEERS IN TUBE FITTINGS AND TUBE WORKING TOOLS

How to Drill Cast Iron



Even at high-speed-steel speeds and feeds, carbides pay off! In drilling these cast iron motor end shields, machine speed is fixed at H.S.S. speeds. Carbide drills give 10 times longer life between grinds. (2500 holes vs. 225 holes!)

*CARBOLOY®

CEMENTED CARBIDE

with Carbide Twist Drills

Send for this free data!

Exhaustive tests, as reported in the trade press, confirm what some plants have long known: Cast iron can be successfully and profitably drilled with *Carboloy Grade 44A. Sound technical data now available.

(Although the Carboloy organization does not make drills, this message is published as a service to the metalworking industry in the interests of the defense program.)

Exhaustive laboratory tests, plus actual use by many plants, show that by simply applying *basic cemented carbide principles* of use, carbide-tipped twist drills can deliver sensational results in the drilling of cast iron.

Recent articles in the trade papers demonstrate this. Users report *doubled* production . . . more than *tripled* drill life over high-speed steel drills *without* special drilling equipment or individual job engineering.

Complete data from tests and other sources have been gathered by Carboloy engineers. *Tried* and *proved* methods of proper carbide technique to speed cast-iron drilling . . . give you the same outstanding benefits in drilling cast iron that you get with cemented carbides on your other metalworking jobs.

For carbide-tipped twist drills, contact your distributor or drill manufacturer. The Carboloy organization does not make carbide twist drills . . . supplies only the high-quality cemented carbide needed for their manufacture.

However, we will be glad to supply you with the latest technical data on proper application and technique, and assist you wherever possible in applying Carboloy Cemented Carbide Grade 44A to your cast-iron drilling jobs. Send coupon for free technical data illustrated.

"Carboloy" is the trademark for the products of Carboloy Department of General Electric Company

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY

"How to Drill Cast Iron With Carbide Twist Drills." Contains technical data on speeds and feeds, equipment, operating conditions, and other information needed for top drilling results.

Reprint of results of recent development work as reported in *Iron Age*, May 31 issue. Contains tests and practical job applications on proper use of carbide in cast-iron drilling.

FREE . . . *Latest technical data on* HOW TO DRILL CAST IRON WITH CARBIDE TWIST DRILLS

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Without obligation, please send us _____ sets of reprints of technical articles on how to drill cast iron with cemented carbide twist drills.

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New Record Set in French 24-Hour Race

By W. F. Bradley

Special European Correspondent for Automotive Industries

THE annual French 24-hour road race at Le Mans was the fastest and most destructive ever held, only 30 of the 60 starters being in the running at the end. It was won by a British Jaguar at the record-breaking average of 93.5 mph. A French Talbot was second, also breaking the record.

Most of the failures were in the engines. Transmissions, brakes, suspension, electrical equipment and body details gave little trouble. With the exception of Aston-Martin, no single team finished complete. These Aston-Martins are a development of the Lagonda designed by W. O. Bentley and now built in the David Brown shops. They finished in third, fifth, seventh, tenth and thirteenth positions.

All entries except Lancia took advantage of the rules that permitted certain changes in stock models. A new V-6 Lancia finished in twelfth position.

The winning Jaguar had the firm's XK 120 C six-cylinder, two-camshaft engine of 3.37 by 4.17 in. bore and stroke. This is one of the latest British sports cars to be put on the market. It set the pace at the beginning, putting up a lap record at 105 mph. Although the team lost two out of its four starters, a Jaguar was in the lead throughout the race.

Briggs Cunningham, of Florida, entered three specials equipped with Chrysler engines. Two of the cars spun in the rain during the night. The third car held second place from the seventeenth to the twentieth hour, when engine trouble developed and it was slowed down to complete the twenty-four hours in eighteenth place at average of 78 mph.

Cunningham was permitted to start after proving that these cars were the first of production models. The engines were equipped with four Zenith carburetors and had a compression ratio of 8 to 1. They used standard gasoline supplied by the race committee. The chassis was special and the suspension and transmission were built up mostly of Cadillac units.

Two Allards, fitted with Cadillac eight-cylinder engines and Ford transmission units, were started. One experienced mechanical trouble early in the race and the second was stopped after running 23 hours.

The single Healey-Nash finished sixth at an average of 89 mph. This had the stock Nash engine, transmission and rear axle, in a Healey chassis and an open English-built body. The only engine changes were in the manifolds. This car went through with no trouble and did not take on water or oil. Its oil capacity had been increased to two gallons.

On formula the winning position was secured by a two-passenger Monopole equipped with an air-cooled flat twin Panhard engine of 45 cu in. displacement. Second place on formula was taken by a Panhard powered by the same engine.

Leather Crimping Machine

Air-Powered **by NOPAK CYLINDER**

FRONT VIEW shows crimping blade and adjustable heated jaws; air and thermostat controls mounted at left.
REAR VIEW shows NOPAK Model "E" 4" x 8" stroke Cylinder, with self-regulating cushion at both ends.

The crimping machine pictured was developed by Western Supplies Co. of St. Louis. It "makes shoes fit better" because it pre-forms leather upper sections, under heat and pressure, so that they can be subsequently drawn snugly against the lasts.

NOPAK Air Cylinder Power was chosen to reduce operator fatigue and increase production . . . to utilize controlled line pressure over the full range of crimping operations . . . to eliminate working parts . . . and because NOPAK mounting characteristics were best fitted to the machine. A study of the cylinder's construction indicated there was "practically nothing to wear out." It was also found to meet the high standards required at a comparatively low price.

GALLAND-HENNING MFG. CO.
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Representatives in Principal Cities.
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Write for Bulletin SW-1 or refer to Sweet's File for Product Designers.

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VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE

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is your News Magazine of Automotive and Aviation
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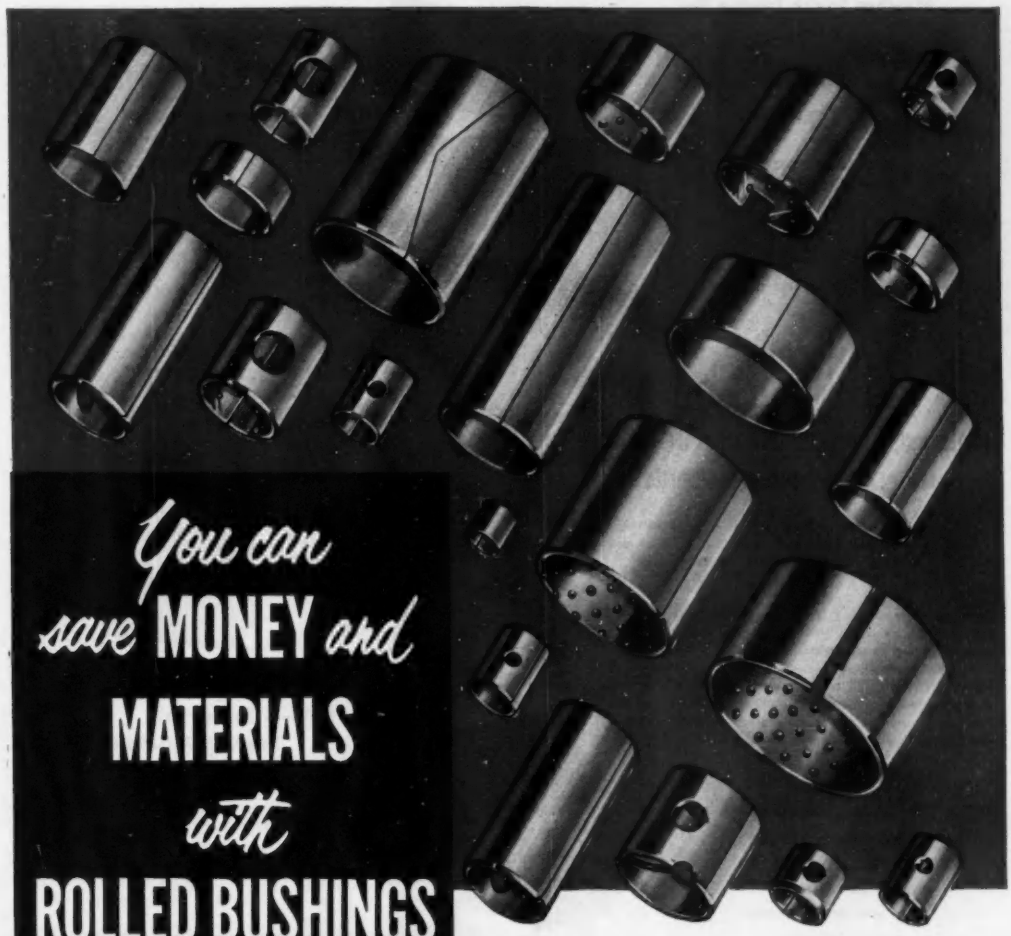


You can save MONEY *and* MATERIALS *with* ROLLED BUSHINGS

When you buy bushings, remember that Federal-Mogul rolled split-type bushings, precision made, can often save material, time and labor without sacrifice of performance standards. Uniformity and strength are obtained through controlled alloy quality and grain structure.

Quality production for hundreds of uses can mean savings in *your* application. Made in a wide range of lengths and diameters and including oil holes, formed oil grooves, slots, cut-outs and standard or special seams. (For heavy duty, high precision or intricate shapes, we also manufacture a wide variety of cast bushings to almost all bronze specifications.) Ask your Federal-Mogul representative or write:

FEDERAL-MOGUL CORPORATION, 11037 Shoemaker
Detroit 13, Michigan

FEDERAL-MOGUL

SINCE 1899

Our six plants produce sleeve bearings in all designs and sizes; cast bronze bushings; rolled split-type bushings; bi-metal rolled bushings; washers; spacer tubes; precision bronze parts and bronze bars.

Whether You're Tooling for:

or

Every Engineering Dept. and Model Shop Needs

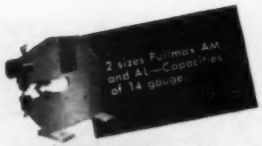
PULLMAX

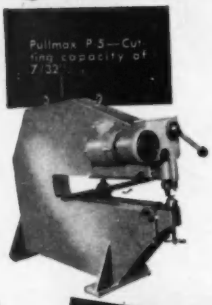
THE MOST COMPLETE LINE OF SHEET STEEL AND PLATE WORKING MACHINES

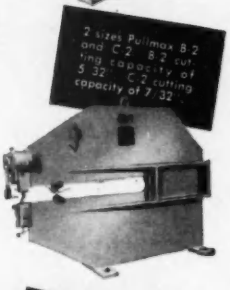
for Working Sheet or Plate Metal in Making Sample Parts and Small Production Runs Without the Expense of Costly Dies

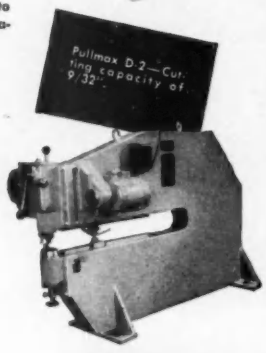
Company after company is discovering the complete versatility of the amazing Pullmax machines. Made in many sizes to fit your requirements.

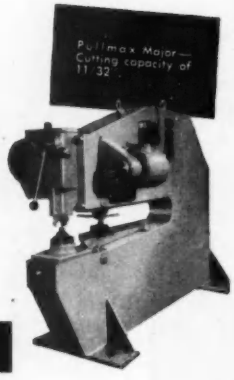
A reciprocating movable upper tool and stationary lower tool provides a smooth perpendicular cut that requires no further finishing. Upper tool can be raised to insert or remove work for cutting in center. Cutting capacities listed are for cutting mild steel.











PULLMAX DOES

- ★ STRAIGHT CUTTING
- ★ CIRCLE CUTTING
- ★ INSIDE CUTTING
- ★ IRREGULAR CUTTING
- ★ SLOT CUTTING
- ★ BEADING
- ★ FOLDING, OFFSETTING
- ★ NIBBLING

PULLMAX MACHINES WORK:

MILD STEEL	WIRE MESH
STAINLESS STEEL	PLASTIC
NON FERROUS METAL	and other materials

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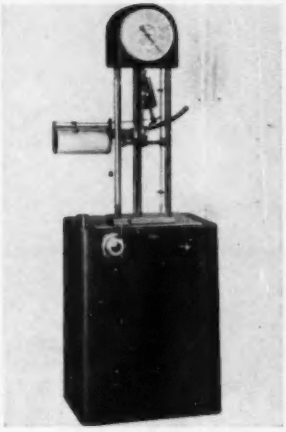
AMERICAN PULLMAX CO., INC.

2633 N. WESTERN AVE., CHICAGO 47, ILL.

NEW PRODUCTS

For additional information please use coupon on page 60

(*Continued from page* 108)



Dillon low range universal tester.

F-48—Universal Testing Machine

A number of improvements have been made to the low-range universal tester manufactured by W. C. Dillon & Co., Inc., Forest Park, Ill. Added features include a zero to 300 lb scale, an improved motor drive operable from zero to 20 ipm, and a solid shaft connecting the speed control to the motor transmission.

Other improvements include a continuous cast quadrant arm, and the location of the speed control dial—now mounted on the top of the tester base.

Tests performed on the machine may be conducted in tensile, compression, transverse or shear.

F-49—Surface Deviation Measuring Device

By utilizing a beam of light as a straight-line reference, deviations of flat surfaces, as small as plus or minus 0.00005 in., may be measured by the Griswold Huet optical straightedge. Put out by F. T. Griswold Mfg. Co., Wayne, Pa., it consists of a lens and prism housing, and a feeler microscope with built-in illumination which rides along the surface under examination.

Made in standard lengths of approximately three, five, 10 and 13 ft, the housing rests on two blocks and the feeler, which includes the optical system, slides on the work surface. Errors,

(*Turn to page* 124, *please*)

Mallory Engineering Experience

Solves Design Problem... Saves Customer Money

Mallory contributes more than a fine product to the solution of a customer's problem. With the product comes the intelligent application of experienced engineering knowledge that cuts costs and eliminates delays.

For example, a large electrical manufacturer, designing a new automobile radio, was unable to match certain elements in the circuit. This company turned to Mallory for advice. The problem was solved quickly . . . with a redesigned transformer, a timing condenser and a Mallory Vibrator. Tests showed excellent results, and a great saving to the customer in engineering time.

That's value beyond specification!

Mallory electronic know-how is at your disposal. What Mallory has done for others can be done for you.

MALLORY VIBRATORS

Mallory Vibrators are based on exclusive design and manufacturing methods that assure long, trouble-free service. Send the details of your application. Get Mallory's recommendation on the Vibrator or Vibrapack* power supply best suited to your needs.

Vibrators and Vibrapack* Power Supplies

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New Defense Plants

SUPPLEMENTING the list of Certificates of Necessity issued up to June 22 authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods, which were published in the July 15 issue, page 54, of AUTOMOTIVE INDUSTRIES, the following additional certificates were announced by the Defense Production Administration between June 22 and July 27. Included in this latest tabulation, 2882 new or expanded defense facilities of all types have been authorized for rapid tax write-off, the total amount eligible for amortization being $8,461,569,605 as of July 27. The figure appearing in parenthesis is the percentage authorized for actual fast tax write-off.

—A—

Aeroquip Corp., Jackson, Mich.
Flexible hose lines—$214,447 (85)

Aircraft Products Co., Del. County, Pa.
Aircraft parts—$83,985 (75)
Aircraft—$28,655 (90)

The Aircraftsmen Co., Inglewood, Calif.
Aircraft—$39,880 (75)

Air Maze Corp., Bedford Heights Village, Ohio
Fuel, oil air filters—$1,697,644 (75)

All Power Mfg. Co., Montebello, Calif.
Aircraft—$19,472 (90)

Aluminum Industries, Inc., Cincinnati, O.
Ordnance—$310,317 (85)

American Bosch Corp., Springfield, Mass.
Tank telescope mounts—$389,528 (80)

Archer Machine Products Co., Los Angeles
Aircraft—$70,636 (90)

Aviation Engineering Corp., Woodside, N. Y.
(Aircraft) fuel gauges—$24,046 (85)

Axelson Mfg. Co., Montebello, Calif.
Component parts for aircraft—$8,012,077 (75)

—B—

Bearings Co. of America, Lancaster, Pa.
Ball bearings—$149,216 (85)

Bell Aircraft Corp., Fort Worth
Helicopters—$2,906,675 (75)

Bendix Aviation Corp., Teterboro, N. J.
Aircraft instruments—$1,138,237 (75)

Bendix Aviation Corp., Sidney, N. Y.
Aircraft magnetos—$463,373 (85)

Blaw-Knox Co., Pittsburgh
Turrets (tanks)—$800,000 (75)

Boeing Airplane Co., Seattle
Aircraft spare parts—$795,985 (75)
Aircraft—$8,515,000 (75)

Bonic, Inc., Detroit
Assembly (tank engines)$67,315 (80)

Brooks & Perkins, Inc., Detroit
Aircraft—$43,243 (85)

The Buckeye Aluminum Co., Wooster, O.
Ordnance—$82,122 (75)

Buda Co., Harvey, Ill.
Diesel engines—$25,839 (75)

—C—

Cessna Aircraft Co., Hutchinson, Kans.
Aircraft assemblies—$106,139 (75)

Cessna Aircraft Co., Wichita, Kans.
Observation airplanes—$1,172,348 (75)
Cargo airplanes—$108,045 (75)

Chrysler Corp., Warren Twp., Mich.
Military trucks—$223,513 (75)

Cochran Foil Co., Cochran Foil Products Div., Louisville, Ky.
Aircraft equipt.—$32,056 (75)

The Cooper-Bessemer Corp., Grove City, Pa.
Gas, diesel engines—$2,211,758 (75)

The Cooper-Bessemer Corp., Mt. Vernon, Ohio
Gas, diesel engines—$1,920,964 (75)

Crocket Mfg. Co., Culver City, Calif.
Airframe parts—$43,195 (90)

Curtiss-Wright Corp., Caldwell, N. J.
Aircraft—$1,126,818 (80)
Aircraft—$70,137 (85)

—D—

Detroit Broach Co., Inc., Fort Lauderdale, Florida
Aircraft—$27,680 (85)

Dial Light Co. of America, Inc., New York
Lights for aircraft—$12,430 (90)

Douglas Aircraft Co., Inc., El Segundo, Calif.
Airplanes—$453,221 (75)

—E—

Ex-Cell-O Corp., Highland Park, Mich.
Aircraft engine parts—$857,175 (80)

(*Turn to page* 118, *please*)

AFTER exhaustive and revealing tests have demonstrated the superiority of VULCAN special-purpose diaphragm materials, many of the leading automotive part manufacturers are now switching to VULCAN diaphragms. Wherever diaphragms are used—as in fuel pumps, vacuum booster pumps, dashpot mechanisms and others, these materials excel in performance. They are highly resistant to gasoline, aromatics, oils, alcohols, butane, propane and solvents. They also provide high tensile and burst strength. They insure long life in continuous service. Investigate these new, improved diaphragms. It will pay!

VULCAN RUBBER

PRODUCTS, INCORPORATED

FIRST AVENUE AND 58th STREET, BROOKLYN 20, N. Y.

Pacific Coast Representative: GORDON Z. GREENE CO., 2335 E. 8th St., Los Angeles 21, Calif.

Are you turning in all your SCRAP?

Don't wait for "George" to do it

IF you are a steel user, this important job of getting more scrap back to the mills is directly up to *you*. You just cannot afford to sit idly by while the scrap shortage gets worse. For unless everyone really pitches into this job of digging out all the scrap possible, steel production is bound to suffer, and every steel user, in more or less degree, will suffer too.

More scrap means *more* steel—it's as simple as that.

Right now some mills have only a bare two-days' supply of scrap on hand. Others have even less. Some steel-making furnaces already have had to shut down for lack of scrap. The situation is serious. Only you can help improve it.

By turning in every piece of worn-out equipment, every obsolete tool and machine, in fact every pound of iron and steel scrap you can comb out of your plant, you'll be helping relieve the worst scrap shortage since Pearl Harbor days . . . and the steel industry will be able to produce more of the steel you need.

Remember—it takes at least one-half ton of scrap to make one ton of steel. To maintain steel's present high production schedules requires more than 1400 carloads of industrial scrap *every* day. So turn in your scrap—ALL your scrap—and keep the mills rolling. This is more than a shortage. It's an emergency that vitally concerns you—and us—and the Nation.

You'll find your local scrap dealers listed in the yellow pages of the phone directory.

USS

1-1348

This page would ordinarily be used to tell you about

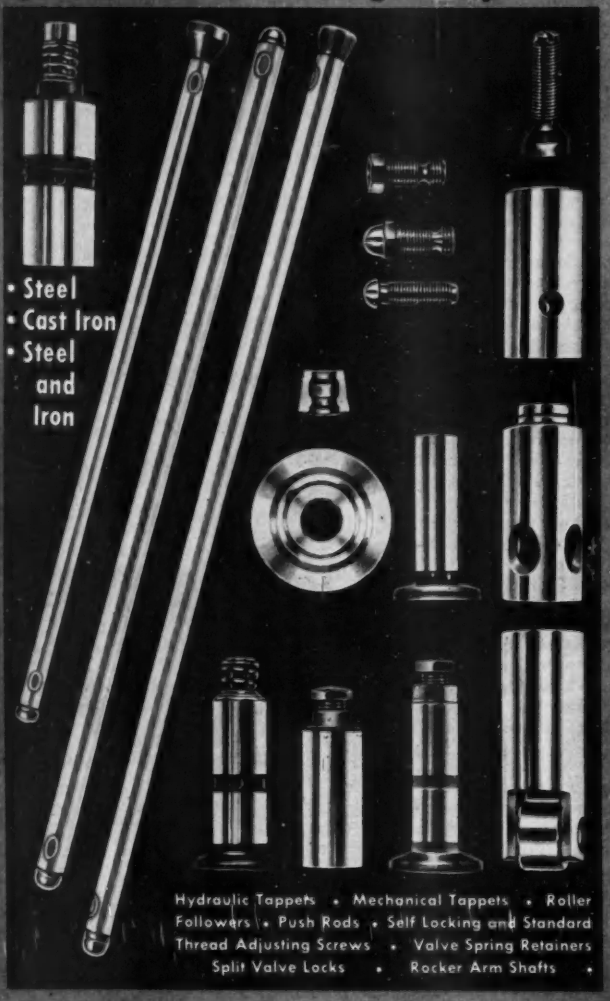
AMERICAN QUALITY SPRINGS

but, because without SCRAP we cannot produce steel, we are asking instead for your all-out help in getting more SCRAP to the mills.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

"CHICAGO"
precision valve gear parts



Hydraulic Tappets • Mechanical Tappets • Roller Followers • Push Rods • Self Locking and Standard Thread Adjusting Screws • Valve Spring Retainers Split Valve Locks • Rocker Arm Shafts •

Connecting Rod Bolts.....Hydraulic Cylinder Pistons
Cylinder Head Studs.....Cylinder Head Cap Screws
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Flywheel to Crankshaft Screws.....Diesel Energy Cells
Wheel Bolts and Studs.....Differential Carrier Screws
Oil Pump to Distributor Shafts.....Remote Control Levers
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Special Screw Machine Parts ⅛" to 2" Diameter • Cap Screws • Set Screws • Nuts • Studs • Taper Pins • Socket Screw Products

The CHICAGO SCREW COMPANY
2801 WASHINGTON BLVD.
BELLWOOD, ILL.
Established 1872

(*Continued from page* 116)

— F —

The Fafnir Bearing Co., New Britain, Conn.
Ball bearings—$7,999,405 (85)

Fairbanks, Morse & Co., Kansas City, Kans.
Diesel engines, pumps—$7,749,770 (70)

Fenn Mfg. Co., Hartford, Conn.
Helicopter parts—$25,787 (85)

The Firestone Tire & Rubber Co., of Los Angeles, Calif.
Fuel cells—$1,399,550 (75)

Ford Motor Co., Livonia, Mich.
Tanks—$22,099,642 (75)

Ford Motor Co., Dearborn, Mich.
Water transportation—$5,350,000 (80)

— G —

The Gates Rubber Co., Denver, Colo.
Wire braid hose—$174,770 (75)

General Electric Co., Everett, Mass.
Aircraft—$33,389 (75)

General Electric Co., Lynn, Mass.
Aircraft—$44,326 (75)

General Motors Corp., Flint, Mich.
Aircraft parts—$15,246,000 (75)

General Motors Corp., Lansing, Mich.
Aircraft parts—$9,155,000 (75)

General Motors Corp., Livonia, Mich.
Trans. assys.—$15,322,556 (75)

General Motors Corp., Muncie, Ind.
Storage batteries—$245,237 (75)

General Motors Corp., Rochester, N. Y.
Electric slip clutch—$38,419 (75)

General Motors Corp., Tonawanda, N. Y.
Aircraft—$20,844,000 (75)

The B. F. Goodrich Co., Akron
Reclaim rubber—$72,800 (70)

The B. F. Goodrich Co., Los Angeles
Aircraft—$345,106 (75)

Goodyear Aircraft Corp., Arizona Div., Litchfield Park, Ariz.
Airship envelopes—$568,584 (85)

Goodyear Tire & Rubber Co., Akron
Wheels for tanks—$228,390 (80)

Great Lakes Mfg. Corp., Cleveland
Aircraft—$19,670 (75)

— H —

R. A. Hawks Co., Sierra Madre, Calif.
Parts of gas turbines—$15,157 (90)

Hotpoint, Inc., Cicero, Ill.
Aircraft—$4,020,125 (75)

— I —

International Harvester Co., S. Chicago, Ill.
Steel bars—$1,050,744 (60)

International Harvester Co., Melrose Park, Ill.
Ordnance—$2,131,499 (75)

— K —

Kenworth Motor Truck Corp., Seattle
Motor truck parts—$62,125 (75)

Joseph A. Kramer dba Plastic Age Co., San Fernando, Calif.
Aircraft—$22,000 (75)

— L —

Libbey-Owens-Ford Glass Co., Toledo
Ordnance—$592,965 (80)

Link-Belt Co., Indianapolis
Ball bearings—$648,230 (75)

Lyons Machine & Mfg. Co., Lyons, Kans.
Aircraft parts—$34,879 (90)

— M —

Manning, Maxwell & Moore, Inc., Stratford, Conn.
Aircraft—$940,114 (75)

(*Turn to page* 120, *please*)

Perhaps we can give YOU a HELPING HAND

● Under present conditions we cannot always give you all the materials you require. But we can give you plenty of help through Revere's Technical Advisory Service. And, our colleagues in American business tell us it's a worthwhile aid, too. We have been rendering this service for many years, and it is backed by a wealth of knowledge accumulated over a century and a half of working with metals.

So, with your problems on the increase, as whose aren't these days, why not check us on what's bothering you and see if we can't help. We are already helping others regarding the usage, to their best advantage, of the products they *can* get.

Since two or more heads can produce more right answers than one, let's get together. You can get in touch with the Revere Technical Advisory Service through the Revere office nearest you.

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SEE "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY

(*Continued from page* 118)

Marlin Rockwell Corp., Jamestown, N. Y.
Ball bearings—$2,539,434 (75)

Marlin Rockwell Corp., Plainville, Conn.
Bearings—$412,118 (75)

McCulloch Motors Corp., Los Angeles
Aircraft engines—$2,069,695 (80)

McDonnell Aircraft Corp., Robertson, Mo.
Airplanes—$94,631 (75)

Michigan Steel Casting Co., Detroit
Aircraft—$15,510 (75)

Mid-Western Industries, Inc., Wichita, Kans.
Airplane parts—$25,653 (80)

Miller Motor Co., Melrose Park, Ill.
Hydraulic cylinders—$599,752 (80)

Monroe Auto Equipment Co., Monroe, Mich.
Ordnance—$48,858 (85)
Ordnance—$16,122 (75)

— N —

The National Supply Co., Terrance, Calif.
Ordnance—$48,677 (90)

Nice Ball Bearing Co., Phila.
Anti-friction bearings—$1,573,251 (85)

Northrop Aircraft, Inc., Hawthorne, Calif.
Airp'ane parts—$76,071 (75)

— O —

Orange Roller Bearing Co., Inc., Orange, N. J.
Needle bearings—$372,833 (85)

— P —

Pacific Airmotive Corp., Burbank, Calif.
Overhaul services—$8,096 (75)

Pacific Airmotive Corp., Chino, Calif.
Overhaul services—$34,102 (75)

Palmer Wellock Tool Corp., Meadville, Pa.
Tank tread forgings—$11,200 (90)

Pantex Mfg. Corp., Central Falls, R. I.
Aircraft—$29,407 (90)

Par Manufacturing Co., Chicago
Aircraft parts—$10,060 (90)

Pattern Products Mfg. Co., Detroit
Aircraft—$47,589 (80)

Piasecki Helicopter Corp., Morton, Pa.
Helicopters—$5,390,929 (75)

Pioneer-Toledo Corp., Toledo
Aircraft parts—$90,000 (90)

— R —

Raybestos-Manhattan, Inc., Passaic, N. J.
Hose—$65,000 (75)

REF Mfg. Corp., Mineola, L. I., N. Y.
Hatches for aircraft—$163,842 (75)

Royal Machine Works, Inglewood, Calif.
Aircraft parts—$10,631 (90)

— S —

Schwien Engineering Co., Los Angeles
Aircraft—$350,000 (75)

C. M. Smillie & Co., Ferndale, Mich.
Aircraft—$16,397 (90)

Standard-Thomson Corp., Dayton, Ohio
Aircraft—$31,791 (75)

Wm. Steinen Mfg. Co., Newark, N. J.
Screw machine parts for aircraft—$84,514 (90)

Stewart-Truck Bodies, Inc., Brooklyn, N. Y.
Truck bodies—$7,300 (75)

Stewart-Warner Corp. (Stewart Die Castings Div.), Bridgeport, Conn.
Zinc die castings—$32,641 (75)

Stewart-Warner Corp., Chicago
Transmitter—$15,663 (75)

Surface Combustion Corp., Columbus
Engine heater—$10,960 (75)

Swallow Airplane Co., Inc., Wichita, Kans.
Aircraft—$18,603 (85)

— T —

Talley Machine & Mfg. Corp., Los Angeles
Aircraft parts—$5,607 (90)

Telectro Industries Corp., Long Island City, N. Y.
Aircraft fuel gauge—$61,600 (75)

Thompson Products, Inc., Cleveland
Aircraft parts—$1,742,857 (75)

Timken Roller Bearing Co., Bucyrus, Ohio
Roller bearings—$3,768,273 (75)

Timken Roller Bearing Co., Canton, Ohio
Roller bearings—$870,955 (75)
Steel bars—$1,158,230 (60)

Timken Roller Bearing Co., Columbus, O.
Roller bearings—$569,585 (75)

Timken Roller Bearing Co., Stark Co., Ohio
Roller bearings—$747,695 (75)

Timken Roller Bearing Co., Zanesville, O
Roller bearings—$29,718 (75)

Timken Roller Bearing Co., Zoarville, O.
Roller bearings—$52,732 (75)
Roller bearings—$52,732 (85)

Torrington Co., Inc. of Ind., South Bend, Ind.
Anti-friction bearings—$1,471,172 (75)

Twin-Disc Clutch Co., Rockford, Ill.
Clutches—$417,863 (80)

— U —

United Aircraft Corp., Dallas, Texas
Aircraft—$1,578,032 (75)
(*Turn to page* 122, *please*)

Highest Precision
HARDENED & GROUND PARTS

THE ball stud shown here is a perfect example of the precision methods and quality material that go into the production of all Brown Hardened and Ground Parts. Twelve separate operations are employed to produce this vital part. Every feature about this ball stud *has* to be right—every feature *is*. It has strength, wear resistance, precision fit, true-ground spherical and tapered surfaces, close inspection and strict uniformity.

Brown Hardened and Ground Parts have been serving the automotive industry for over 40 years. We refer you to any of our long list of satisfied customers. For information pertaining to your own requirements, simply write or wire.

Henry W. Brown
PRESIDENT

THE BROWN CORP.
213 BELLEVUE AVE. SYRACUSE, N. Y.

Designed in Metal... to give you samples before blueprints

Every new SPEED NUT design is worked out on manual presses to provide samples for testing and approval BEFORE blueprints of the part are drafted

SPEED NUT time-savings begin early. Experimental samples are created faster because Tinnerman engineers streamline the design process.

A design-in-metal is created with only a rough draft as a guide. Dies that pierce, bend, trim are selected from thousands like those illustrated below. These are set up in a series of manually operated presses to shape bits of metal into fasteners engineered for specific fastening functions. The samples produced are accurate prototypes of the finished fasteners, and can be used for mock-up assemblies.

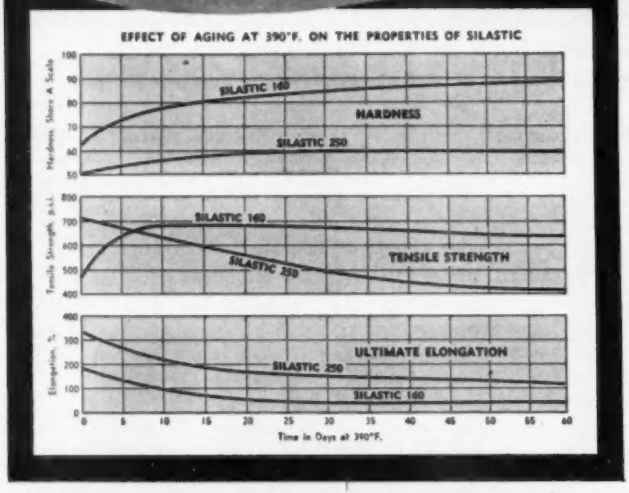
These parts are then tested and approved by the customer before blueprints are drafted and the part is put into production.

In times like these, high-geared fastener engineering saves valuable production hours and profit dollars. Proof of Tinnerman's ability to serve you is outlined in a new 20-page booklet, "A Story of Quality". Write for your copy. TINNERMAN PRODUCTS, INC., Dept. 12, Box 6688, Cleveland 1, O.

In Canada: Dominion Fasteners Ltd., Hamilton. In Great Britain: Simmonds Aerocessories, Ltd., Treforest, Wales.

Long after organic rubber melts or becomes brittle . . .

SILASTIC* still stays Elastic!



We're talking about an elastomer that retains its rubbery properties at temperatures far above and far below the limits of any other elastic material. That is indicated by the effects of accelerated aging at 350°F. on the properties of two typical Silastic stocks with brittle points in the range of −70° to −130°F.

Silastic is being widely used at temperatures in the range of 250° to 600°F. and at temperatures ranging from −75° to below −100°F. It shouldn't be called a rubber because that term invites comparisons that are not valid. At room temperatures, the physical properties and abrasion resistance of Silastic are well below the values normally associated with rubber. Conversely, at temperatures well within the serviceable limits of Silastic, rubber rapidly becomes a soft gum or a brittle solid.

The important thing about Silastic is that it retains its physical, chemical and dielectric properties over a temperature span of about 600 Fahrenheit degrees. When you need rubbery properties or good dielectric properties in a resilient and flexible material at temperatures beyond the limits of ordinary rubber, investigate Silastic.

*T. M. REG. U. S. PAT. OFF.

***SEND TODAY!** for your copy of Silastic Facts No. 10 containing new data on the properties, performances and applications for all Silastic stocks.*

from +500°F. **SILASTIC** stays Elastic to −100°F.

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(*Continued from page* 120)

— W —

The Waco Aircraft Co., Troy, Ohio
Aerial delivery kits—$12,476 (85).

Western Gear Works, Seattle
Gears—$27,500 (90)

Westholt Mfg., Inc., Wichita, Kans.
Aircraft—$13,855 (80)

Westinghouse Electric Corp., Lima, Ohio
Dynamotors—$2,931,300 (75)

Weston Hydraulics, Ltd., N. Hollywood, Calif.
Aircraft hydraulic valves—$67,117 (85)

Wm. R. Whittaker Co., Ltd., Van Nuys, Calif.
Aircraft—fuel & hyd. valves—$2,427,250 (80)

Worth Mfg. Co., Los Angeles
Parts for aircraft—$3,106 (90)

Chrysler Corp.—**Alan G. Loofbourrow** has been appointed assistant chief engineer of the chassis design section of the central engineering division. **Stephen J. Tomkins** has been appointed chief engineer of the Jefferson and Kercheval plants. **Carl J. Demrich,** master mechanic of the Lynch road plant, has been appointed supervisor of the company's central estimating department at the Highland Park Plant.

Fansteel Metallurgical Corp.—**Herbert B. Clark** was elected a director at a recent meeting of stockholders.

Daystrom, Inc., Instrument Div.—**William W. Fisher, Jr.,** has been appointed general manager.

Willys-Overland Motors, Inc. — **A. Patrick Nagel** has been appointed director of industrial relations.

Illinois Tool Works—**Robert J. Carroll** has been named assistant advertising manager.

Consolidated Vultee Aircraft Corp.—**H. N. May** has been appointed chief of material and **J. C. Buchan** purchasing agent, both at the San Diego Div.

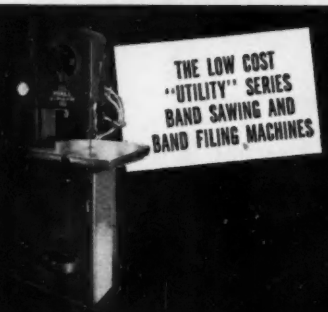
Cold Welding

(*Continued from page* 41)

small sizes of rods and wires can be made with a hand tool.

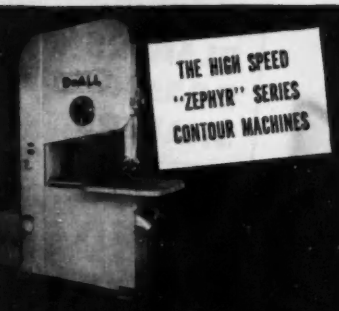
Improvements have been made in the manufacturing techniques for producing tubing from flat ribbon and sheet stock by the Koldwelding process. With the new process, tubing smaller than ⅛ inch OD has been produced and a production rate of more than 50 fpm has been obtained. This tubing can be threaded after welding. The improved tubing has smooth inside and outside surfaces, and is somewhat stronger than the tubing made by the original Koldweld process which left a small rib along the line of the weld.

THERE IS A DoALL BAND MACHINE FOR EVERY PURPOSE AND EVERY POCKETBOOK

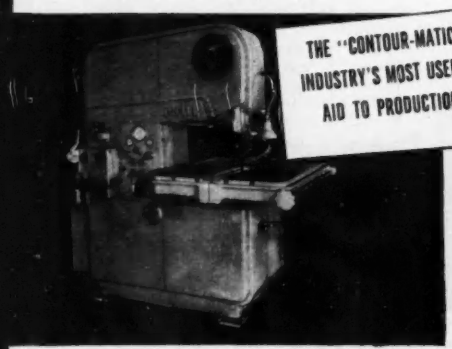


• Four models—16" throat. Variable dual speed range 50 to 350 F.P.M. and 860 to 5200 F.P.M. Also available fixed speed. For small shops and experimental or model work in large shops.

• Five models—precision machines for general purpose band machining. 50 to 1500 F.P.M. variable speed for conventional metal cutting. ½ to 2 H.P. Throat depths 16" to 60". These are multi-purpose machines—sawing, filing, polishing.



• High speed—500 to 15000 F.P.M., fixed or variable. 16" to 60" throats. 2 H.P. to 15 H.P. For high speed sawing of non-ferrous metals and non-metallics, friction cutting ferrous sheet, plate up to 1".



• The features and capabilities of all other models *plus* hydraulic controls, wider speed range, more power, greater tool variety, etc. Cuts any material, any shape. Use as all-purpose or single purpose tool—works faster, better; cuts costs, increases output per man.

EVERY SHOP can have the benefits of DoALL band machining, the fast, economical process that "slices" material apart instead of reducing it to pile of chips. There is a line of DoALL Band Machines and Band Tools for precision cutting every material, every conceivable shape—sawing, line grinding, polishing, honing, friction sawing, cutting. For production, for maintenance, for toolmaking—there is a DoALL machine to save manhours, material and money, to free other machines to work for which they are better suited. Find out what DoALL can do for you. Ask to have a DEMONSTRATION of a DoALL Band Machine right in your plant. Call your local DoALL Sales-Service Store or write:

THE DoALL COMPANY • 254 N. Laurel Ave., Des Plaines, Ill.

SEND FOR CATALOG

Learn about the complete machining facilities offered by modern DoALL Band Machines.

INDUSTRY'S NEW TOOLS

DoALL

27 SALES-SERVICE STORES

B-3

Machine Tools . . . Gaging Equipment . . . Tool Steel . . . Band Tools . . . Metal Working Supplies

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 60

(*Continued from page* 114)
observed through the microscope, are indicated by the relative position of two indices. The distance between these indices is converted into linear measurement by reference to a micrometer thimble.

Surface contours may be graphically recorded by accessories attached to the equipment. Deviations, enlarged by 1000, are traced for permanent record on coordinate paper as the feeler is moved from one end of the housing to the other.

PLANERS
BORING MILLS
SHAPERS

with THE
STANDARD

QUICKLY
CONVERTED TO
DUST-FREE
GRIT-FREE
GRINDERS

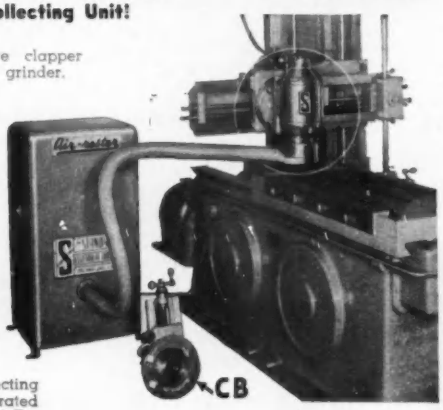
Type PAV Vertical Spindle Grinder; Telescopic Wheel Guard; "Air-Rester" Dust Collecting Unit!

METHOD: Simply remove clapper box "CB" and mount grinder.

Investigate this STANDARD time and money saving combination today!

TYPE PAV from ½ H.P. to 25 H.P. Speeds from 3600 to 1200 R.P.M. Equipped with vertical or horizontal feed, or both feeds. Micrometer feeds. Hollow spindle for wet grinding. For cup wheel, plate mounted cylindrical wheel, or straight grinding wheel.

"AIR-RESTER" dust collecting equipment. (Also illustrated and available separately.) For all kinds of dust, grit, etc. Three sizes.



36" Openside Sharper converted into a grinder with STANDARD TYPE PAV Vertical Spindle Grinder, telescopic wheel guard and "Air-Rester" dust collector.

PROMPT DELIVERY
WRITE FOR CATALOG 44 TODAY!

The STANDARD ELECTRICAL TOOL Co.

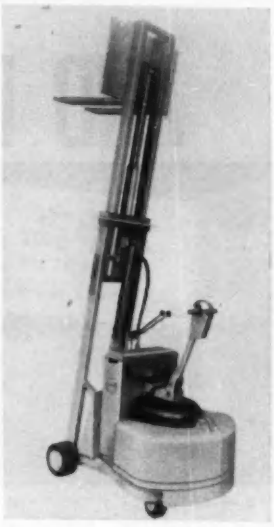
ALSO:

GRINDERS—ALL KINDS! UP TO 100 H.P. • BUFFERS—POLISHERS UP TO 60 H.P.
ABRASIVE BELT MACHINERY • SPECIAL MACHINERY • TWIN WHEEL TOOL GRINDERS

2541 RIVER ROAD • CINCINNATI 4, OHIO

F-50—Electric Fork Trucks

For materials handling tasks where heavy loads must be raised a number of feet as well as moved, the Barrett-Cravens Co., Chicago, has added four Hi-Lift electric trucks to its Power Ox line. These units retain the basic characteristics of the Power Ox: the walking operator; electric lift and travel; and finger tip control of all movements.



Barrett-Cravens electric fork truck, the Hi-Lift.

The Hi-Lift telescopic tilting fork lift truck was developed for stacking pallet, skid and box loads. It has a total lift of 121¼ in. and a capacity of 2000 lb with a 24-in. load center.

Another Hi-Lift, the non-tilt fork truck, is for operations where its fork elevation of 61¼ in. is adequate and tilting is not required. It also has a capacity of 2000 lb with 24-in. load center.

With a lifting height of 68 in., the third model, straddle type, has a capacity of 4000 lb up to 30-in. load center.

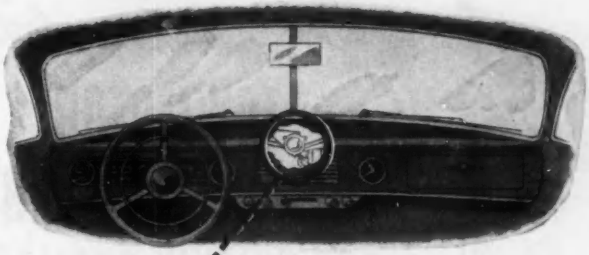
The fourth unit,, a platform truck, is designed with a platform elevation of 72½ in., and a capacity of 4000 lb.

F-51—Material Handling Planning Kit

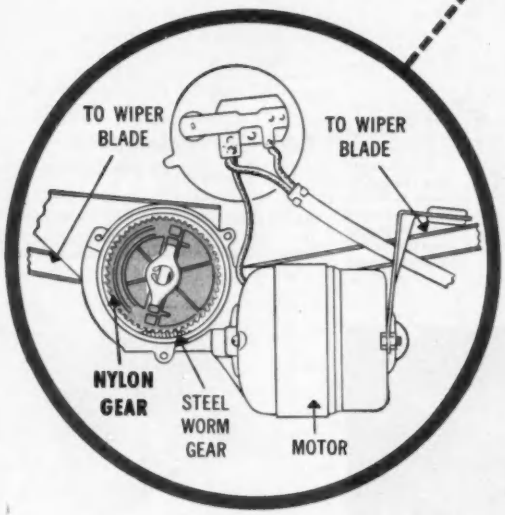
For studying material handling problems a low-cost planning unit, announced by Triometric, Inc., Pittsburgh, Pa., is available in three sizes.

The unit comprises tools and planning aids for making material handling flow diagrams in manufacturing plants,

(*Turn to page* 126, *please*)



Wiper gear molded of Du Pont NYLON



Nylon gear, 2¼" in diameter, is molded for Redmond Co., Inc., Owosso, Mich., by Perry Plastics, Inc., Erie, Pa.

gives outstanding performance, costs ½ as much as machined gears

When this new electric windshield wiper was in the design stage, Redmond Company engineers tested conventional machined gears and gears injection-molded of Du Pont nylon. Not only was it found that nylon gears gave excellent performance, but they cost about half as much as machined gears, because of the economies of rapid, mass-production injection-molding. For the complete nylon gear is molded in one piece . . . no machining needed for gear teeth, the slots which transmit power to wiper blades, or the "parking ramp" that returns blades to lower edge of windshield when power is switched off.

It's another case of performance and economy for an automotive part molded of Du Pont nylon. Nylon has the strength and resiliency this gear needs. In case the wiper blades freeze to the windshield, the nylon gear can take the full thrust of the motor.

Heat-resistance is also necessary. Since the nylon gear performs satisfactorily at 200°F., its heat-resistance is more than adequate to do the job. Further, nylon has outstanding abrasion-resistance, and requires a minimum of lubrication.

Demand for nylon currently exceeds supply. However, we suggest you investigate the properties of nylon for future application. We will gladly discuss the availability of quantities for development work. For additional information on nylon and other Du Pont plastics write:

E. I. du Pont de Nemours & Co. (Inc.)
Polychemicals Department, District Offices:
General Motors Building, Detroit 2, Michigan
350 Fifth Avenue, New York 1, New York
7 South Dearborn Street, Chicago 3, Illinois
845 East 60th Street, Los Angeles 1, California

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...THROUGH CHEMISTRY
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PLASTICS • CHEMICALS

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To make available man-power more productive Towmotor Fork Lift Trucks provide continuous service on all handling jobs. However, even normal mechanical operations require occasional replacement parts to maintain top operating efficiency. To take care of your Towmotor requirements, your Towmotor Representative carries a full line of GENUINE Towmotor-Specified Replacement Parts. TOWMOTOR CORPORATION, Div. 45, 1226 E. 152nd St., Cleveland 10, Ohio.

Genuine Towmotor-Specified Parts are easy to identify, easy to handle and are delivered to you in perfect condition in this specially designed package.

TOWMOTOR PREVENTIVE MAINTENANCE SERVICE ELIMINATES DOWN TIME!

Available through Towmotor Representatives, *Towmotor Preventive Maintenance Service* helps keep your Towmotor equipment up to maximum operating efficiency, assuring extra years of trouble-free service. Towmotor Preventive Maintenance Inspections by factory-trained mechanics can be scheduled for periods when your Towmotors are not in service.

Write for full details!

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THE ONE-MAN-GANG

FORK LIFT TRUCKS and TRACTORS
RECEIVING • STORAGE • PROCESSING • DISTRIBUTION
12 Models—A Towmotor for every job

HOW MANY PEOPLE HAVE YOU TALKED TO ABOUT AMERICANISM TODAY?

NEW PRODUCTS

For additional information please use coupon on page 60

(*Continued from page* 124)

warehouses and transportation terminals. It includes: a sturdy plastic-surface planning board with ¼-in. ruled squares; over 900 accurately scaled templates representing personnel and equipment; colored strips for indicating boundaries of buildings, storage areas, roadways and laydown areas; a dual-station methods engineering ruler; a plastic marking pencil; and rubber cement.

Also furnished with the unit are two instruction bookets: one describes the proper method of preparing flow diagrams; and the other gives step-by-step directions for analyzing and improving material handling methods.

F-52—Variable Speed Countershaft Drive

A countershaft drive, offered by Speed Selector, Inc., Cleveland, Ohio, provides wide speed variations for many applications. This new variable speed drive is designed for installations

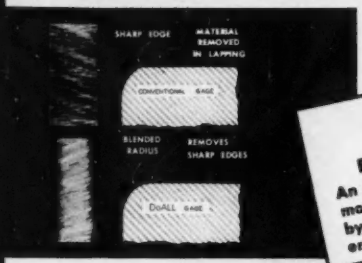
Speed Selector countershaft drive.

where driven shaft speeds must be lower than motor shaft speeds. It utilizes 7-in. and 8-in. combination sheaves and is available for drives from two to 15 hp.

Assembly consists of a sealed ball-bearing countershaft stand, secured by slide rods to an adjustable motor support for all motor sizes up to NEMA #326. Built-in control can be mounted in any one of a number of positions.

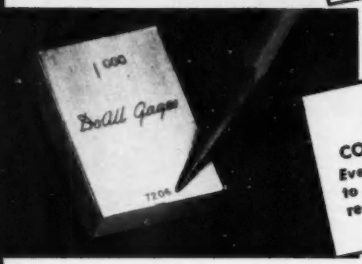
The various parts can be assembled as a sliding motor base only; a sliding countershaft base; a fixed-center countershaft drive for ratios up to eight to one, or a compound variable drive with speed changes up to 64 to one. Remote control devices can be adapted.

COMPACT CASE
They can be carried in your pocket; are easier to handle.



BURR-PROOFED
An exclusive process removes the edge burr left by lapping to give longer life, greater accuracy.

EASY TO USE
No fumbling to pick the blocks from the case — they stand up!



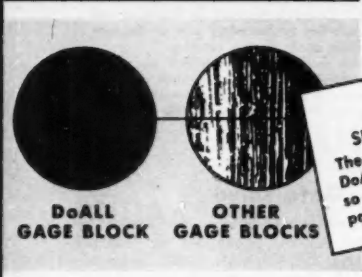
INDIVIDUAL CONTROL NUMBERS
Every block is numbered to keep sets matched, records accurate.

These Exclusive DoALL GAGE BLOCK features . . . mean Better, Low Cost, Quality Control

DoALL Gage Blocks are adaptable to literally thousands of critical inspection jobs. For example, with one set of 83 blocks and a few accessories *you can quickly make 120,000 different snap gages for about 1/4 cent each!* And you have micro-inch accuracy. DoALL Grade AA Gage Blocks are accurate to plus or minus two millionths of an inch; Grade A to four millionths; Grade B to eight millionths.

Use them for checking other instruments and finished parts. You cannot buy finer inspection equipment. DoALL Gage Blocks last longer, are easier to use, cost less in the long run than any others. *Ask to see DoALL Gage Sets at your plant*—your local DoALL Sales-Service Engineer will demonstrate them for you.

THE DoALL COMPANY, 254 N. Laurel Ave., Des Plaines, Ill.



DoALL GAGE BLOCK **OTHER GAGE BLOCKS**

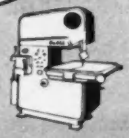
SUPER-FINE SURFACE FINISH
The primary reason why DoALL Gage Blocks last so long. Note the comparison.

COMPLETE LINE OF ACCESSORIES
DoALL-developed accessories multiply Gage Block usefulness a thousand-fold.

MODERN MEASUREMENT CONTROL
Send for this new 20 page Bulletin describing DoALL Gage Blocks and Accessories. Ask about DoALL Calibration Service for your present gage blocks!

DoALL

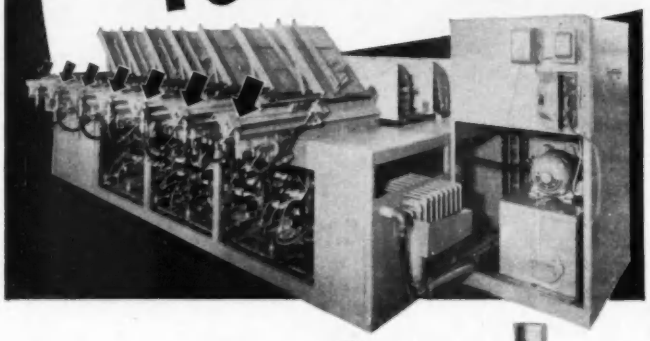
GB-1

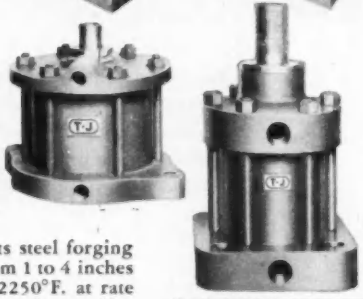


Machine Tools . . . Gaging Equipment . . . Tool Steel . . . Band Tools . . . Metal Working Supplies

Job File No. 3259

Feeds Automatically WITH T-J CYLINDERS





T-J Hydraulic Cylinders furnish efficient, automatic "push power" for feeding devices in this new Ajax-Northrup induction forge heating equipment.

This unit—manufactured by Ajax Electrothermic Corp., Trenton, N. J.—automatically heats steel forging stock in sizes ranging from 1 to 4 inches (rounds or squares) at 2250°F. at rate of 7500 to 8500 lbs. per hour. Has space for 8 heating stations . . . each with *hydraulically operated billet feeding devices employing T-J Cylinders.* These cylinders also eject heated bars automatically. Induction heating with this equipment results in uniformity of successive billets fed to the forge—thus controlling quality of finished forgings and reducing rejects.

Do you have a tough job in power movement—pushing, pulling or lifting? Let T-J help you *simplify machines, save labor* and *cut costs* by using T-J Air or Hydraulic Cylinders! Many standard sizes and styles . . . cushioned or non-cushioned . . . 100 lb. or 50,000 lb. Precision-built, long life. Write for more information. The Tomkins-Johnson Co., Jackson, Mich.

FOR POWER MOVEMENT IN ANY DIRECTION

100 LBS. or 50,000 LBS.

35 YEARS EXPERIENCE

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RIVITORS · AIR AND HYDRAULIC CYLINDERS · CUTTERS · CLINCHORS

T-J

New AIRCRAFT PRODUCTS

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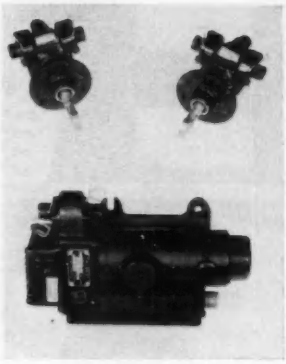
S-9—Quick-Disconnect Fitting

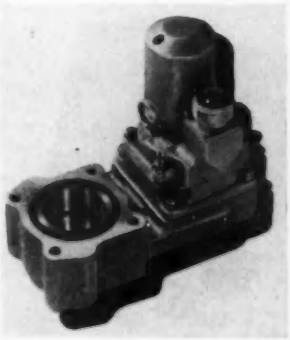


For time-saving shortcuts in installation and servicing of accessories Lear, Inc., has brought out a quick-disconnect fitting. This is a feature of their model 150 series power units and Model 568A screwjacks, and eliminatess the need for fastening and unfastening of the safety wire at the connection of the flexible shafting.

The model 150 series power units with the quick-disconnect fittings were designed for use in various actuating systems requiring either 27 volt d-c or 400 cycle a-c reversible motors.

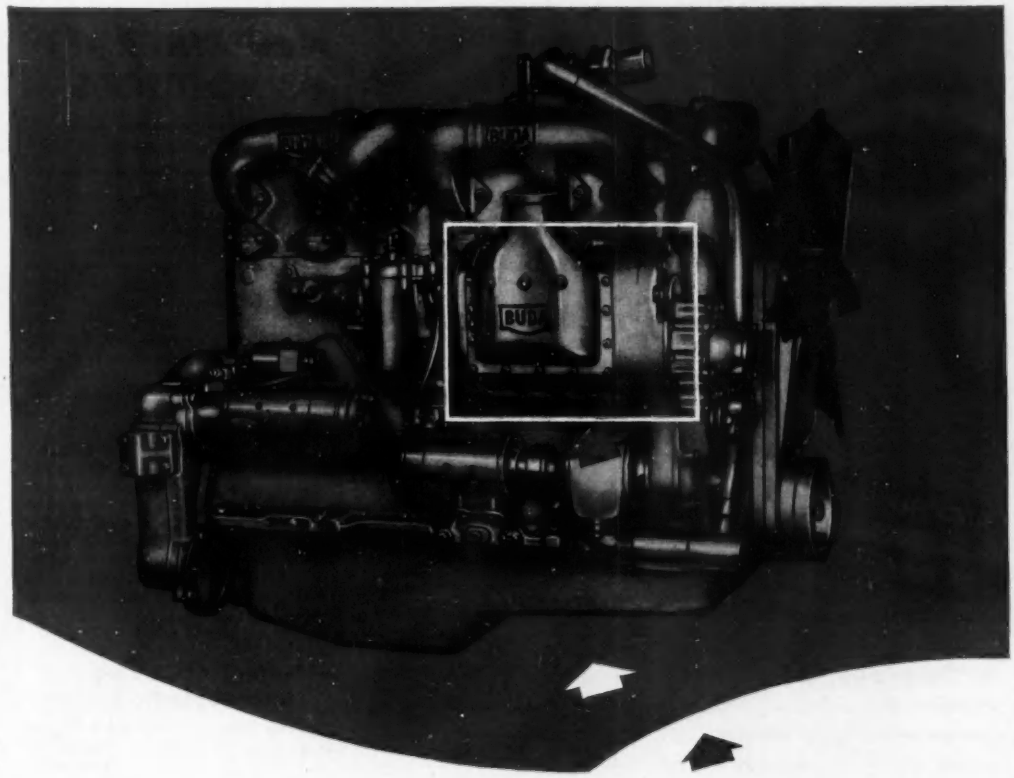
S-10—Aircraft Gate Valve

A motorized gate valve known as Model AV-16, announced by General Controls Co., Glendale, Calif., is an addition to the company's hi-g line of automatic controls for use in jet planes,



General Controls Co. motorized gate valve, Model AV-16.

(*Turn to page* 130, *please*)



BUILT-IN POWER

BUDA Diesels use B-W Superchargers built in for added horsepower and economy

The Buda Company of Harvey, Illinois, uses B-W Superchargers on their diesels. This automotive diesel engine, Model 6-DAS-844, develops 280 brake horsepower at 2,100 r.p.m. Designed for heavy-duty truck operation both at sea level and altitude. The supercharger on this engine is one of a standard line developed by Pesco Products Division.

For motor truck, marine, railway or general industrial applications, supercharging means savings in engine space and weight . . . means power to pull heavy loads . . . means sea level operation at high altitudes. All these extra benefits without corresponding increases in operating costs.

The engine manufacturer who wants to pack more power into a given engine size . . . or who wants to add an entire new series of models to his line without retooling or the expense of redesign, can do so simply by equipping his present line with B-W Superchargers. One of our engineers will gladly explain how this can be done. There is no obligation. Write today to:

engineering Pesco production
PRODUCTS DIVISION

BORG-WARNER CORPORATION
24700 NORTH MILES ROAD BEDFORD, OHIO

The primary function of LORD Mountings is to isolate vibration. When this is accomplished machines and equipment operate with higher efficiency . . . run smoother, quieter . . . service life is lengthened. Personnel fatigue is reduced . . . production increased . . . scrap losses diminished . . . maintenance costs lowered.

All these important factors mean added sales appeal, and you will improve your product sales appeal by eliminating costly, nerve-racking vibration and noise. LORD Mountings protect equipment from either internal or external vibration.

Vibration-control should be planned as an integral part of your product. LORD Engineers will assist you to most effectively adapt flexible mountings to your designs . . . select mountings of proper type, size, and deflection . . . position the mountings for greatest effectiveness.

Whether you make sensitive instruments or massive machinery, it will be to your advantage to make LORD Vibration-Control part of design. For improved product sales appeal, bring your vibration problems to LORD . . . Headquarters for Vibration-Control.

LORD MANUFACTURING COMPANY, ERIE, PA.

LORD BONDED RUBBER

Vibration-Control Mountings
. . . Bonded-Rubber Parts

New *AIRCRAFT* PRODUCTS

For additional information please use coupon on page 60

(*Continued from page* 128)

guided missiles, rockets and other military equipment.

Features of the valve are one-piece body construction, and quick change of motor and actuator assembly. The entire actuator assembly can be removed for replacement or overhaul without disturbing the main valve installation.

By removing four bolts holding the operator assembly to the valve, the motor operator can be replaced with a manually operated handle, an assembly equipped with bearings to carry cable rigging loads, or a motor assembly with an integral manual over-ride. The valve meets all standard specifications, handles all standard fuels and gases, and meets all proposed Army-Navy requirements. It is advisable in one in. to four in. tube sizes, is built for standard A-N fitting connections, and with or without thermal relief.

S-11—Aircraft Wiring Thermoplastic Tubing

Tubing, known as Fluoroflex "C," is being made available by Resistoflex Corp., Belleville, N. J., as "spaghetti" for electrical wiring on military aircraft. The new insulation is declared suited to severe service under the cold encountered at high altitudes and the heat around jet engines, withstanding temperatures from —150 F to +375 F continuously. The tubing is flexible, has excellent dielectric properties. It is unaffected by concentrated acids, alkalies, gasoline, oil, water, high humidity or tropical exposure. It is also said to be non-inflammable, transparent, and to possess high tensile strength. Fluoroflex "C" spaghetti is manufactured to order in sizes up to ½ in.

S-12—Sub-Miniature Aircraft Relays

A complete series of sub-miniature relays has been developed by Allied Control Co., Inc., New York, N. Y., for aircraft and airborne equipment. These relays, designated type MH, are available in two, four and six pole, double throw and have been developed to meet the requirements of the USAF Spec. MIL-R-5757.

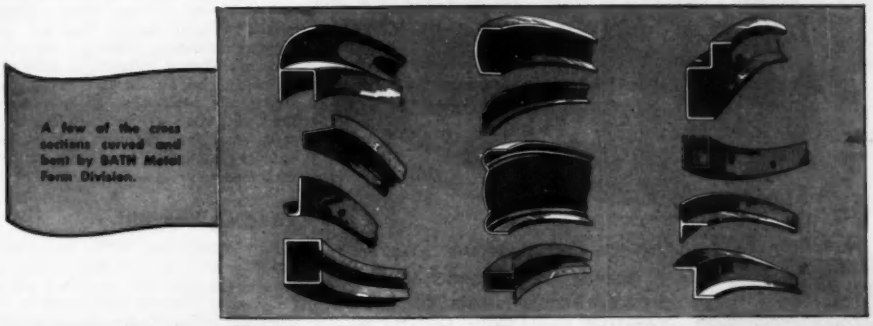
Operating range for standard type MHB is —55 C to 85 C, and for high temperature type MHA is —65 C to 200°C. All types are said to withstand aircraft vibration of 10 G's and shock of 30 G's of 10 milliseconds duration, as an operating condition. They are

(*Turn to page* 136, *please*)

WE PRODUCE THE CURVED METAL PARTS *for...*

- √ Jet Engines
- √ Air Frame Sections
- √ Airplane Skin Sections
- √ Airfoil Sections
- √ Engine Containers
- √ Helicopter Frames

Our Custom Forming Division serves metal working industries by bending and fabricating—from many cross sections, whether extrusion, rolled, bar, strip or sheet—in any metal, whether aluminum, carbon, alloy steel, stainless or bronze—to most any curve, whether shallow or sharp, constant or compound. Send blueprints and production requirements for prompt quotation.



Trailer roof cap (left), formerly an assembled section, is formed in one piece by BATH. Coach frame (right), includes reverse bends.

Curves not normally formable, or too costly to form on conventional equipment, are no problem for the BATH method.

The CYRIL BATH *Co.*

Established in 1915

6915 MACHINERY AVE. • CLEVELAND 3, OHIO

10 YEARS SERVICE ON CONTOUR FORMING TO THE METAL WORKING INDUSTRIES

The Business Pulse

(*Continued from page* 52)

of buying by consumers or by firms now attempting to work off inventories.

Some Uncertainties Continue

Such conclusions, however, do not imply that all uncertainties have been eliminated. A depressing influence in some divisions of industry and trade in recent weeks has been the uncertainty over the future of price controls that has accompanied the heated debate on extension of the Defense Production Act. As of this writing, the only certainty is that the President has not been granted the broader authority he desired, since the extension act as finally passed curbs the regulatory powers of the Administration. The principal question now remaining is the extent to which these curbs will affect the future stability of prices and wages.

The ban on price rollbacks under the temporary one-month continuation, combined with the fluctuating prospects of price control itself, brought trading in some markets to a virtual standstill in July, pending the clarification of the outlook. More definite but equally restrictive so far as marketing is concerned was the introduction in July of the Controlled Materials Plan for steel, copper, and aluminum to replace the limited priority system that had been in operation since last November. Although the scheme deals specifically with only these three basic materials, its effect is to control strategic production in general, since such production in most of its branches depends on the supply of the three controlled materials. The intricate network of classifications according to use, claimant agencies, requirement committees, and industry divisions, had the initial effect in July of throwing markets into a state of confusion unknown since World War II.

In theory at least, allotments are so regulated as to leave known amounts of the controlled materials in a "free area" outside the plan, for use in the manufacture of consumer durable goods. Officials believe, however, that it may become necessary, beginning with the fourth quarter of this year, to bring civilian durable goods fully within the plan—that is, to program the production of such goods in the same way that defense and so-called defense-supporting production is programmed.

Pending Tax Bill

In Washington, the prospective deadline for Congressional action on the pending tax bill has been set by the Senate Finance Committee at October 1. Although the Senate version of the House bill was incomplete in July, it seems apparent that the ultimate measure will fall at least $3 billion short of the $10 billion asked by the Administration. Senate tax hearings during the month shed little new light on possible methods of obtaining additional revenue. The hearings were almost a repetition of those previously held by the House Ways and Means Committee for about six months. Many of the same witnesses were heard; many of the same organizations were represented; and again high Treasury officials presented their views relating to future income and expenditures.

The most forcefully presented tax proposal was, ironically, one which political observers regard as having the least chance of being incorporated into the final bill. Three organizations during the month brought forward basically similar plans for a general sales tax which, they believe, would provide the necessary revenue while at the same time drawing from the moderate-income groups, where the inflationary potential is greatest. Comments such as that made by Senator Tom Connally, who suggested that the witnesses were

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Lamb Electric Motors, built to precision standards of high quality materials, also make available: reduced *product* weight, increased dependability, compactness, improved appearance and lower cost.

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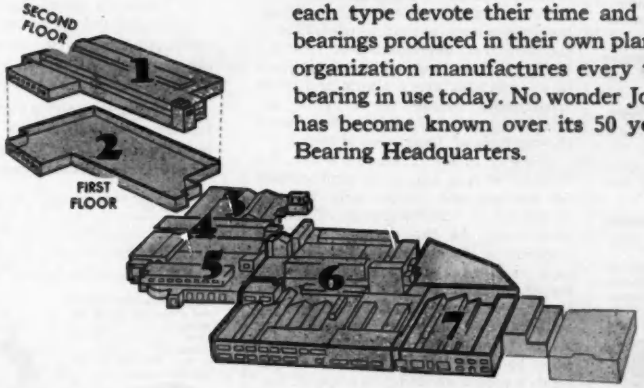

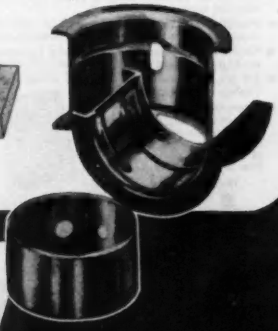

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simply proposing a transfer of taxation from themselves to the consumer, are deemed to reflect the probable attitude of the Senate committee leaders.

Estimates of Spending

A view of the Administration's proposed expenditures through the 1953 fiscal year was provided during the hearings by the Secretary of the Treasury and the Assistant Budget Director. Estimates of spending and revenue for this fiscal year would show a possible deficit of $9.9 billion (about $3.1 billion if the House bill were enacted). Spending estimates for fiscal 1953 were placed at $80 billion to $90 billion, as compared with the $68.4 billion for the present fiscal year and about $44.2 billion for last year. Military spending alone during this fiscal year is estimated at $42 billion and is expected to rise to about $60 billion in fiscal 1953. By fiscal 1954 military expenses are expected to decline to a level of about $40 billion a year.

NATIONALIZATION
—a New Truman Doctrine

(*Continued from page* 32)

tion of an industry, especially by expropriation, jeopardizes the holdings of Americans in other nations that our country needs. Two years ago Mr. Truman began a program of encouraging investments abroad to cooperate in the industrial development of retarded nations. Now their oil properties, ore lands, manufacturing plants and other investments become the prey of unscrupulous political leaders. Such were the methods of Lenin and Hitler.

In reply to Mr. Truman's letter, the Premier of Iran expressed appreciation for his support, particularly the endorsement of nationalization of the oil properties. At the same time, from somewhere the Iranian officials must have received a green light, for they moved quickly to obtain a $25 million loan from Uncle Sam's Export-Import bank to offset the loss of royalty payments from the British. Our dollars could be spent to advantage by giving foreign people an understanding of our time-proven free enterprise system rather than wasting our money on their socialistic schemes.

The failures of nationalization in France and England are evidence of how this economic illusion is impoverishing the peoples of those countries. Their transport, fuel, power, and other industries have been set back years in development. Profits have turned to losses. Therefore, it is vital that all American business concern itself with this new Truman doctrine to prevent its adoption.

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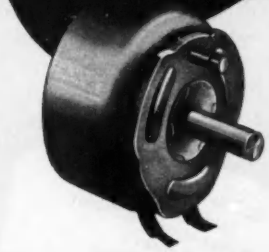
ROTARY SOLENOID



SOLVES MANY REMOTE CONTROL PROBLEMS

The many production applications of Ledex Rotary Solenoids vary from the dependable, snap-action tripping of airborne bomb releases to the actuation of rugged, hydraulic valves in heavy duty materials handling equipment.

Five Ledex Rotary Solenoid models are manufactured. Diameters range from 1⅛ to 3⅜ inches. Predetermined rotation up to 95° can be engineered to suit your product's requirements. Starting torques for 45° stroke range from ¼ pound-inches to 50 pound-inches.

We supply to quantity users and solicit the opportunity to be of assistance in engineering a Ledex Rotary Solenoid to meet your product's requirements.

MODEL NO.	2	5	6	7	8
Diameter	1⅛"	1⅞"	2¼"	2¾"	3⅜"
Torque lb./inches	¼	5	10	25	50
Weight lbs.	⅛	½	1	2¼	4½

Magnetic action moves the armature along the solenoid axis. This action is converted into a rotary motion by means of ball bearings on inclined races.

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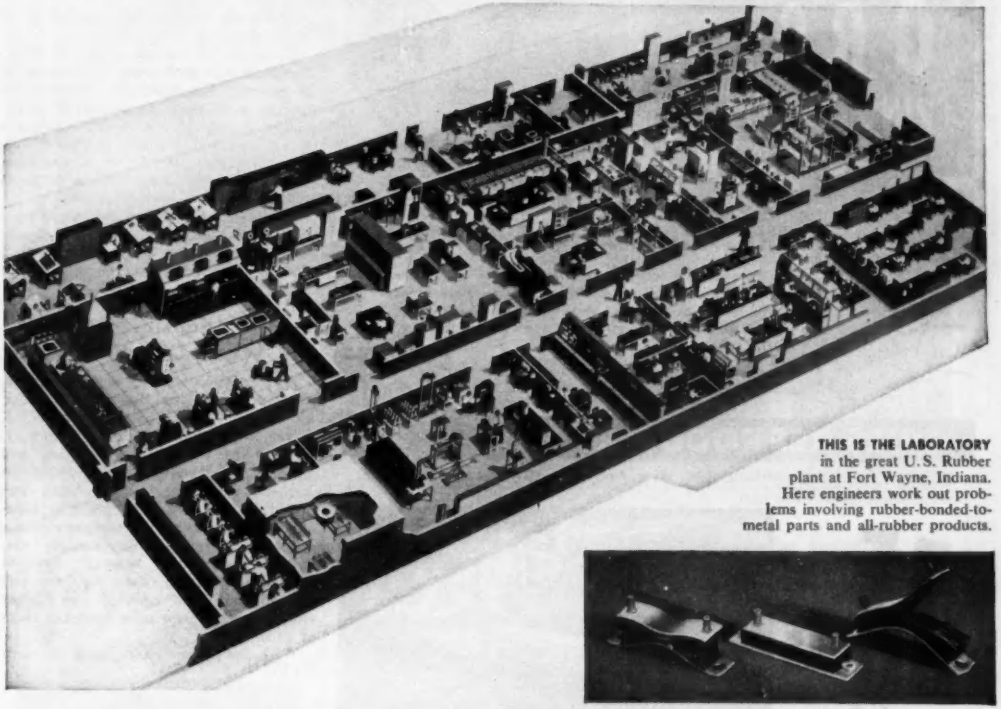

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(*Continued from page* 130)

hermetically sealed for operation to 70,000 ft.

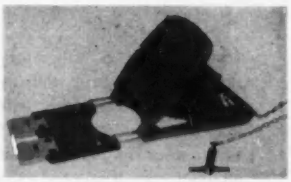
Nominal coil voltage is 26.5 volts d-c. The coils will withstand overvoltage of 23 percent for eight hr. Relays will operate at 18 volts d-c or less after exposure to any of the stated conditions of voltage and ambient temperatures, and will release at 13 volts d-c or less. Minimum power requirements at room temperature is less than 1 watt.

Contacts are rated at two amps noninductive at 28 volts d-c. Contact circuit resistance measures less than 0.02 ohms from terminal to terminal.

S-13—Collapsible Aircraft Wheel Chock

A collapsible aircraft wheel chock, developed in cooperation with the RAF by Pyrene Mfg. Co., Newark, N. J. (Pyrene Co., Ltd., London, England), is said to overcome difficulties and dangers in chocking high powered jet aircraft while engines are being run up either for testing or prior to takeoff. Wooden chocks, the company points out, are becoming increasingly unsuitable for modern aircraft, due not only to difficulty in removing from soft ground, but also because the higher engine powers now used increase risks of chock slip.

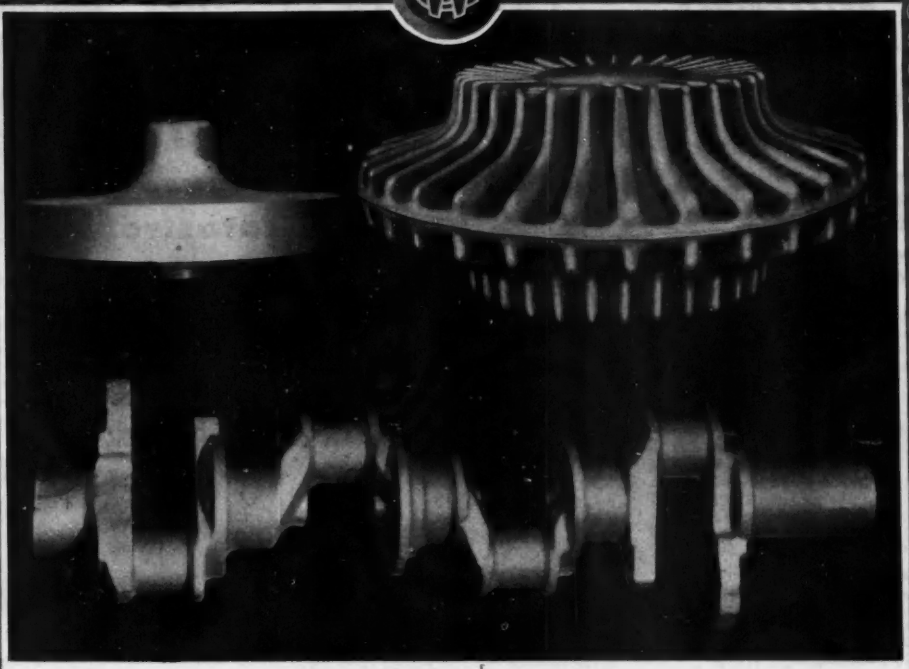
With the pyrene chock, said the company, slip is prevented by providing a flexible shoe under each wheel, thereby making maximum use of the weight of the aircraft to obtain sufficient ground friction. The danger element is removed by thus preventing slip and by enabling the chock to be operated and removed from a safe distance.



Pyrene collapsible aircraft wheel chock

The chock consists of an all metal collapsible ramp and a flexible shoe. The ramp comprises two spring loaded metal frames hinged together and forced into the extended position by downward pressure on the foot lever. This action closes the two claws that

(*Turn to page* 138, *please*)



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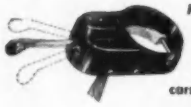
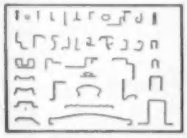


Mitchell clamp-on and screw-type semi-automatic turn signal switch for trucks, cars, buses, tractors.

Mitchell 6-wire concentric-type semi-automatic turn signal switch used in passenger cars.



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(*Continued from page* 136)

lock the rubber and metal wheel shoe to the ramp. In this position the assembly forms a complete non-slip chock that has been tested to withstand a thrust of 10,500 lbs.

On the order "away chocks" each member of the ground crew concerned may free the chock simply by giving the 12-ft operating chain a sudden pull *at right angles* to the chock itself. This instantly causes the chock to collapse and to be pulled clear, and simultaneously to release the claws securing the chock shoe. The aircraft may now travel forward leaving the chock hands absolutely clear and immune from danger.

In anchoring the wheels of static aircraft for parking, the company suggests that twin "Pyrene" chocks be used. For this purpose two ramps and one shoe are used. Each operating chain is fitted with a tensioner handle and the ramps embody slots to which the chains may be secured. Upon screwing up the tensioners the chains become taut so that the wheels are firmly secured between the two chocks thus preventing either forward or backward movement.

S-14—Edge-Lighted Instrument Panels

Sierracin 5005, a plastic material manufactured by Sierra Products Co., Compton, Calif., has been designed for aircraft edge lighted instrument panels. Although Army-Navy specification AN-P-89 specifies the requirements for such panels a deviation to the AN-P-89 was granted to cover the non-crazing thermosetting plastic from which the 5005 panels are cast.

According to the firm this plastic will not craze in the presence of alcohol, lacquer thinner, methyl ethyl keytone, standard commercial cleaners, aviation gasoline, skydrol, and any of these solvents may be used to clean the panels.

Physical properties of these panels are as follows: Tensile strength is over 9000 psi; flexual strength ranges from 16,000 to 18,000 psi; heat distortion point is 170 F with a resistance to continuous heat of 240 F; per cent of elongation is from four to six; thermal conductivity ranges from 4.5 to five with a thermal expansion of 5.5 F to seven F; compressive strength is 30,000 psi; luminous light transmission is 90 per cent; and its electrical properties are said to be excellent.

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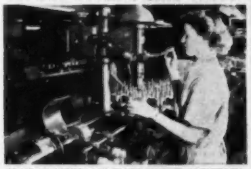

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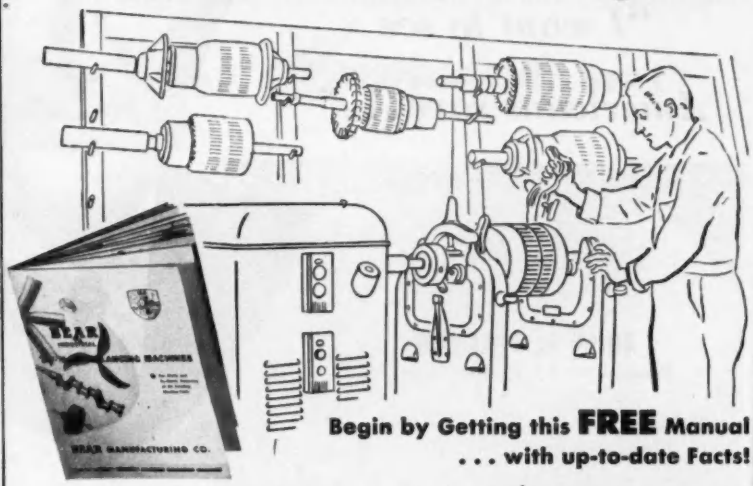

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As Chairman of the Ohio Payroll Savings Advisory Committee, Mr. Collyer knows what is being accomplished by leaders of industry, top management and labor in their joint effort to step up the Payroll Savings Plan. A few recent figures should be interesting to those not so familiar with the national picture:

• In the steel industry campaign, Carnegie-Illinois Steel Corporation (now U. S. Steel Company), recently raised its payroll participation from 18% of 100,000 employees to 77% . . . Columbia Steel Company of California went from 7.9% to 85.2% . . . American Bridge Company signed 92.8% of the workers in the large Ambridge plant . . . 87% of Allegheny-Ludlum Steel Corporation's 14,000 employees are now on the Payroll Savings Plan . . . Crucible Steel Company of America, reinstating its plan, signed up 65% of its 14,500 employees.

• In the aviation industry, Hughes Aircraft Company went from 36% to 76%; Boeing Aircraft enrolled 10,000 new names before Christmas.

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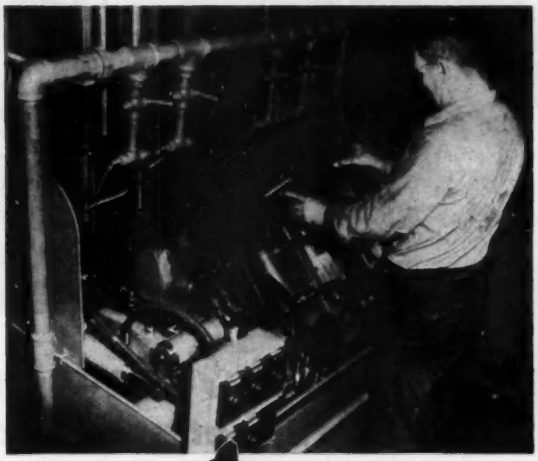

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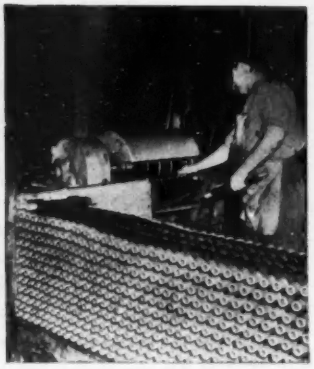
See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

THE FIGHTING MACHINE. Tanks of this type are equipped with track pins of the type shown at the left.



THE BRUSHING MACHINE. Molded track pins are fed in one at a time. An Osborn Disc-Center Wire Wheel Brush meshes with each of six sections where flash and film are to be removed. Areas are cleaned thoroughly in a few seconds and pin is discharged.

What plays clean-up on the rubber-steel team?

...a brush! These are track pins of army tanks. Here, rubber "tires" are bonded to steel pins to produce strong, quiet-operating parts for the rigors of tank warfare.

The problem was to remove the rubber flash and film from six bearing and electrical-ground sections of the pin after molding. With the help of the **O**sborn **B**rushing **A**nalyst, a machine with six Osborn Disc-Center* Wire Brushes was devised to remove the excess rubber from all six areas simultaneously . . . in a matter of seconds.

Throughout all industry, Osborn power brushes are simplifying cleaning and finishing operations and improving products of every description. Here's how an **O**sborn **B**rushing **A**nalyst can help you. Call or write, *The Osborn Manufacturing Company, Dept. 493, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

*Trademark

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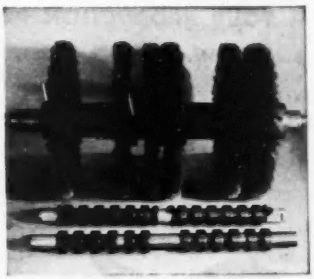
LOOK FOR THE NAME OSBORN...RECOGNIZED EVERYWHERE FOR QUALITY WORKMANSHIP AND MATERIALS



THE BRUSH SET-UP. This photo shows construction of arbor with six Osborn Brushes spaced to fit into track pin grooves where rubber is to be removed. In the foreground are track pins before and after brushing.

For QUICK STOPS

Equip Your Vehicles with . . .

MIDLAND AIR BRAKES

WITH

Husky 7.4 Cu. Ft. AIR COMPRESSOR

The big, powerful Midland Air Compressor puts tremendous thrust back of Midland Air Brakes. Here's braking force that gives new meaning to the words *safety* and *dependability*. Here's positive control for any load—on the straightaway, on curves or steep grades.

Unique, patented precision compressor inlet valves provide tremendous output.

Governor is an integral part of compressor, operating directly on the inlet valves.

The driver is always sure of sufficient reserve power for any emergency.

Midland's fully-compensating valve construction has been incorporated in the new Air Hy-Power. Fine graduation and brake pedal "feel" are provided, similar to that in passenger car brakes.

Investigate the merits of Midland Air Brakes. See the Midland Distributor near you, or write or phone to us in Detroit.

FIELD INSTALLATION KITS

Midland Air Brake Kits are specially designed to accommodate most popular makes of trucks, tractors and trailers.

These kits incorporate Midland's new Air Hy-Power unit with special brackets and all parts and fittings necessary to insure long, dependable service.

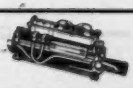
Midland Kits are so well illustrated that any mechanic can easily make installation by following the diagrams furnished.

The **MIDLAND**
STEEL PRODUCTS COMPANY
6660 Mt. Elliott Ave. • Detroit 11, Mich.
Export Department: 38 Pearl Street, New York, N. Y.

Air and Vacuum **POWER BRAKES**

World's Largest Manufacturer of AUTOMOBILE and TRUCK FRAMES

Air and Electro-Pneumatic **DOOR CONTROLS**



BANK ON MONARCH-

Cash in these Vital Production Savings

Production—production—more production—that's the pressure today. More and more output is needed, from every machine, operator, kilowatt and square foot. Are you getting work output that *can't be exceeded* by any new production methods—such as those offered by the most advanced types of modern Monarch Lathes? Before you say "Yes", study the Monarch plus values below. Figure how these savings might be translated into improved output for you. Then, let's get down to cases—and let a Monarch sales engineer furnish actual studies on the jobs you've got right now.

★ ★ ★ ★ ★

SAVE VITAL MATERIALS. Scrap losses, especially with unskilled manpower, can be high. Great reductions in spoilage occur when Monarch's duplicating methods replace the human factor in repetitive turning.

SAVE ON SUBSEQUENT OPERATIONS. With less stock left to remove, grinding time is often reduced by as much as 50%.

CONSERVE SCARCE SKILLED MANPOWER. Even green personnel can operate Tracer-Controlled Monarch Lathes, once the job has been set up.

MULTIPLY OPERATOR'S OUTPUT. Case histories show many instances where one Tracer-Controlled Monarch Lathe has replaced three or even four conventional machines. The fact that he can readily run two machines, on many classes of work, doubles the operator's output.

SAVE ON TOOLS. Save time and money on costly form tools—save on tool-sharpening and tool change time with the Monarch Tracer-Controlled single tool metal turning principle. Insert-type tools save even more! Let us show actual figures.

★ ★ ★ ★ ★

Want to cash in on these Monarch savings? We make a complete line of Production, Toolmakers' and Engine Lathes and *three* kinds of Tracer Controls applicable to most of them—the Monarch-Keller, Air-Gage Tracer and Motor Trace Controls. We'll gladly furnish complete information and data. Just ask us for Booklets, indicating your interests . . . *The Monarch Machine Tool Co., Sidney, Ohio.*

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

if SERVICE "down-time" is Your problem

THE flange type bearing assemblies in MECHANICS Roller Bearing UNIVERSAL JOINTS can be lifted out, simply by removing eight screw bolts that hold them in place. A wrench and screwdriver are all the tools needed to remove and replace worn flange-type bearing assemblies. The operation requires only fifteen minutes.

MECHANICS
Roller Bearing
UNIVERSAL
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For Cars, Trucks, Tractors, Farm Implements, Road Machinery, Industrial Equipment, Aircraft

Let our engineers help you design MECHANICS Roller Bearing UNIVERSAL JOINT applications that will give your new or improved models this and several other advantages.

MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner

2024 Harrison Ave., Rockford, Ill.

Ever see such a fast-moving assembly line?

It is amazing how fast the automotive industry has moved.

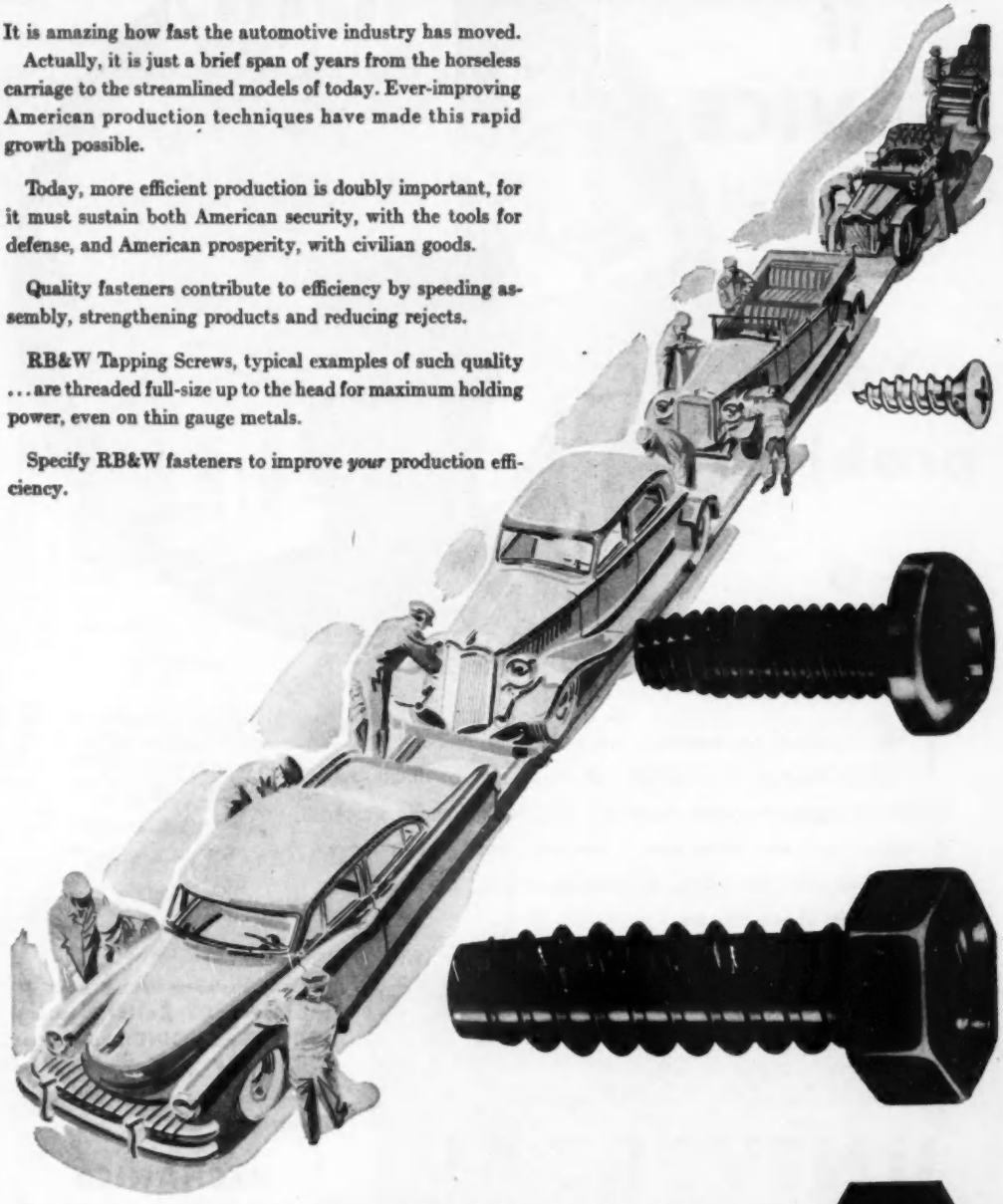
Actually, it is just a brief span of years from the horseless carriage to the streamlined models of today. Ever-improving American production techniques have made this rapid growth possible.

Today, more efficient production is doubly important, for it must sustain both American security, with the tools for defense, and American prosperity, with civilian goods.

Quality fasteners contribute to efficiency by speeding assembly, strengthening products and reducing rejects.

RB&W Tapping Screws, typical examples of such quality ... are threaded full-size up to the head for maximum holding power, even on thin gauge metals.

Specify RB&W fasteners to improve *your* production efficiency.



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RB&W
THE COMPLETE QUALITY LINE

Plants at: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill., Los Angeles, Calif. Additional sales offices at: Philadelphia, Detroit, Chicago, Dallas, Oakland. Sales agents at: Portland, Seattle.

106 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

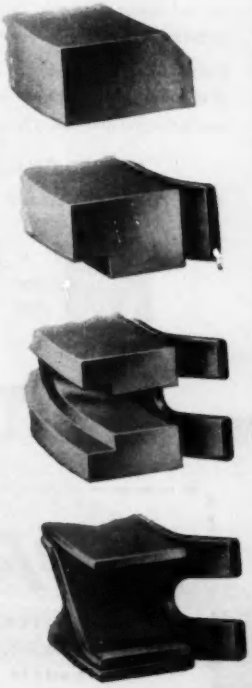
"Made for Each Other!"

SERVICE PISTON RING SETS BY MUSKEGON

Muskegon works with engine builders to design piston rings especially for their specific engines. Thus each ring and its companion rings, each set of rings and its corresponding engine are indeed "made for each other" and work together to achieve the very maximum of performance, mileage, and economy.

Furthermore, Muskegon's facilities for the casting, processing, finishing, inspection, and packaging of these Service Piston Ring Sets are unparalleled.

These *Factory Approved* and *Factory Engineered* Service Piston Ring Sets are available from your car dealer or other authorized service outlets.



MUSKEGON

Piston Rings

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PLANTS AT MUSKEGON AND SPARTA

"THE ENGINE BUILDERS' SOURCE"

Call on Morse

for better timing drive performance

It almost goes without saying that Morse makes the finest timing drives available today. For Morse Timing Drives give you greater design and manufacturing freedom, save assembly time. And, of course, Morse Timing Drives perform better, longer, more quietly; give efficient, trouble-free service.

What's more, Morse stands ready to help you get the performance *inherent* in Morse Timing Drives. We offer our engineering and design assistance, based on forty years of timing drive leadership and close cooperation with automotive engineers.

Have our engineers review your present timing drive situation or make recommendations for timing drives on your engines now in the planning stage. Write us today for more information.

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Dept. 185, 7601 Central Ave., Detroit 8, Michigan

M=TC

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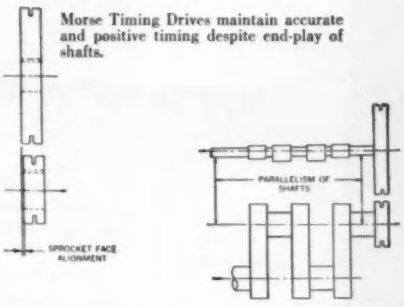
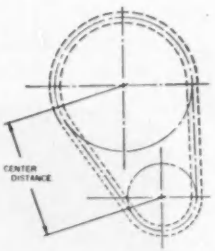
Four major advantages of Morse Timing Drives

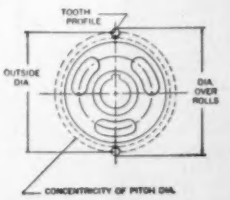


Morse Timing Drives maintain accurate and positive timing despite end-play of shafts.

Morse Timing Drives assure safe, quiet performance though camshafts and crankshafts are not exactly parallel.



Morse Timing Drives permit greater engine block tolerances and economical production because of increased center distance tolerance on drive.



Morse Timing Drives permit greater manufacturing tolerances on sprockets, therefore allow the production of a complete drive under the most favorable and economical conditions.

MURRAY-WAY is THE BETTER-WAY of automatic buffing, polishing and grinding

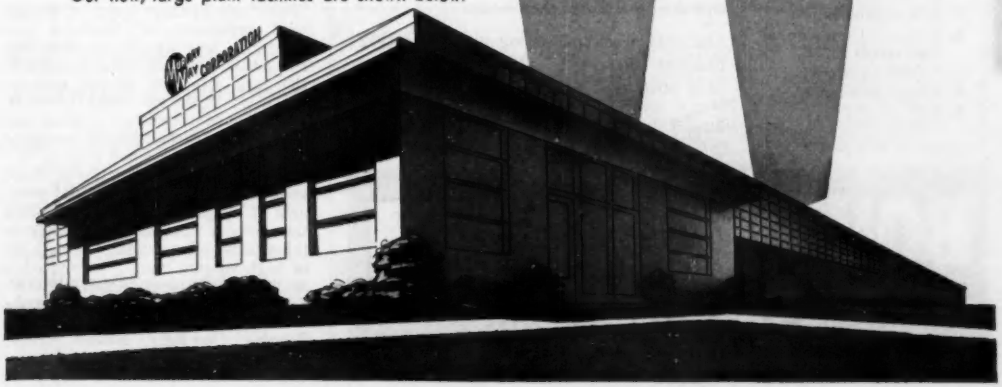
Murray-Way's complete standard line of "production tested" automatic polishing, buffing and grinding equipment has been developed through years of experience and actual application in plants throughout the country.

The combination of these versatile production-tested units and smart Murray-Way engineering will give you right-the-first-time installations without delay or trouble.

If you have a metal surfacing problem that calls for special-built equipment, Murray-Way is your answer. During the last war, our engineering staff speeded the conversion of many manufacturers with automatic metal surfacing equipment specially designed to accomplish jobs never before attempted. This valuable experience is yours for the asking.

THE MURRAY-WAY CORPORATION
POST OFFICE BOX 180—BIRMINGHAM, MICHIGAN

Our new, large plant facilities are shown below.



Low Operating and Maintenance Cost IS ONE OF THE 6* OUTSTANDING ADVANTAGES OF "COMPO"® and "POWDIRON"®

BEARINGS AND PARTS

*THE 6 OUTSTANDING ADVANTAGES OF "COMPO" and "POWDIRON" are

1. Low operating and maintenance cost
2. Low installation cost
3. High load capacity at high speeds
4. Extreme quietness
5. Efficient lubrication
6. Low unit cost

Constantly maintained oil film keeps both *starting* and *running* friction down. Replacements are virtually nil — relubrication is simple, if needed! Incorporate "COMPO" and "POWDIRON" bearings and parts in *your* product designs — give your customers the cost-saving features they want.

Cut costs *yourself* by using stock "COMPO" bearings wherever possible — write on company letterhead for up-to-minute catalog.

Send for this FREE Booklet

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(Advertisement)

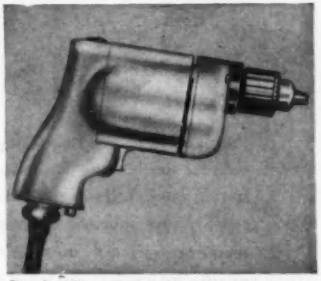
POWDER METALLURGY

PARTS EFFECT OPERATING SAVINGS

Cost-conscious users of production machinery are becoming increasingly aware of the over-all savings made possible in the operation of machines equipped with "COMPO" and "POWDIRON" bearings and parts. Maintenance expenses are reduced, since in many instances "COMPO" and "POWDIRON" need no re-lubrication during the life of the equipment. When more severe service conditions do require re-oiling, the job is extremely simple—it is only necessary to bring oil into contact with the part. Even this simple attention is required only at infrequent intervals.

OTHER OPERATING SAVINGS

The "COMPO" and "POWDIRON" method of lubrication maintains an oil film on the surface of the bearing or part at all times, thus preventing metal-to-metal contact. This feature reduces wear and prevents scoring of shafts. Bearing replacement is a very rare occurrence, and machine downtime is greatly reduced.



Electric drills equipped with "COMPO" bearings run smoothly and quietly, with minimum maintenance requirements.

HOUSEHOLD AND BUSINESS APPLICATIONS

While the average user of household appliances or business machines is less aware of operating costs than the industrial executive, the long life and simple maintenance of "COMPO" and "POWDIRON" are important selling advantages in these types of products too.

The manufacturer can build these good-will features into his products at surprisingly low cost, since the powder metallurgy process is inherently economical, especiallly in high-volume runs. Information on "COMPO" and "POWDIRON" for specific applications may be obtained from Bound Brook Oil-Less Bearing Company, Bound Brook, N. J.

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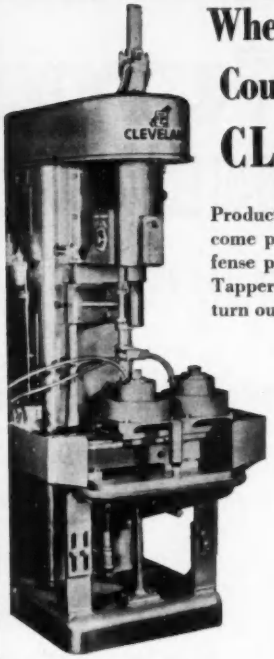
CLEVELAND tapping machines *lead screw*



When Every Hour Counts...Rely on CLEVELAND

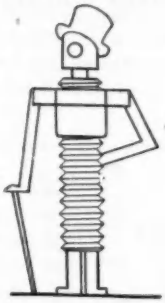
Production hours saved can become pretty important in a defense program... and Cleveland Tappers save production time... turn out more perfect pieces per hour. They cut tapping costs by combining operations...turn semi-skilled workers into skilled operators. Cleveland engineers can design a machine for your needs which will not only combine several operations but also tap groups of holes at one stroke of the machine. If you have a production problem check with Cleveland FIRST.

A CLEVELAND TAPPER set up on a munitions job, tapping a 1 15/32", 16-pitch Buttress thread in SAE 4143 steel tubing hardened to 35 to 37 Rockwell.

Cleveland offers all these features

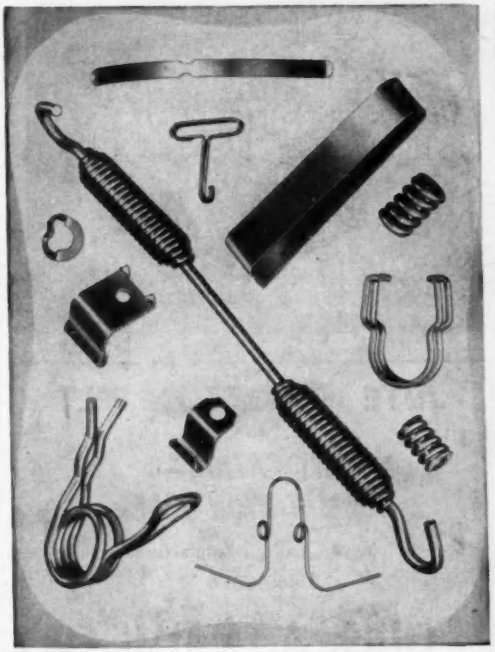
- Precision hardened and ground lead screw.
- Fully automatic or manual control.
- Precision depth control for blind hole tapping.
- Heat treated alloy steel spindles for maximum strength.
- Easily changed spindle speeds.
- Exclusive super sensitive clutch reduces breakage and increases tap life.
- Positive coolant and lubricant supply under constant control of operator.
- Rigidly constructed to give years of service.
- Maximum safety for operator and machine.

Meet Mr. Lead Screw



of The Cleveland Tapping Machine Co. Mr. Lead Screw symbolizes the time-proved lead screw feed designed and pioneered by Cleveland . . . now generally accepted as the key to precision tapping at high speeds. Write for your copy of the Cleveland Production Tapping Guide and a copy of Catalog AT-4.

THE CLEVELAND TAPPING MACHINE CO.
A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC. • CANTON 5, OHIO •



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. . . or any other type that must be able to pass rigid inspection, and do the job for which they were designed? Let us show you how our complete spring making facilities can solve your spring problems. Give us an opportunity to quote on your designs . . . we think you'll like the way we serve you. Call or write NOW!

Producing Clutch Pressure Springs
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Markem methods, machines, type and inks have been marking the products of industry for forty years. Markem machines can mark up to many thousands of pieces per hour. They make clear, durable imprints on flat, curved or irregular surfaces of paint, paper, wood, glass, metal, leather, plastic, rubber, fabric, composition and pressure sensitive tapes. No special skill is needed for their operation. Legend and color of imprint may be quickly and easily changed.

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When your products need marking for Identification, Control or Market — ask Markem. Submit your problem, together with a sample of the item to be marked. Markem Machine Company, Keene 8, New Hampshire.

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Do You Want a Promising Future ?

Then let us tell you about America's Newest, Youngest, most promising industry

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There are a few excellent opportunities open with a pioneer helicopter company. We want the best for a long-range program. A program that looks to the future. Space limitation does not permit full particulars but if you are an

AERONAUTICAL or MECHANICAL } ENGINEER or DESIGNER

who wants to see where he is going we would like to tell you of the excellent opportunities in America's newest industry. Submit qualifications and experience to

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with flammable Liquids

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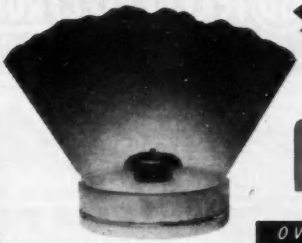
Save 30% or more with BURDETT INDUSTRIAL OVENS featuring "RADIANT HEAT" PRINCIPLE

SEE and BELIEVE at no cost to you!

We invite you to learn the cost-reducing and time-saving secrets of BURDETT "RADIANT-HEAT" Industrial Ovens, without one cent of cost to you. Bring in your product and the paint you are currently using. We will put a test-run through our equipment for you and establish comparative figures that will prove, without a doubt, that there is no quicker nor more economical method of heat processing. This test-run offer includes any HEAT problem, whether it is paint drying, enamel or lacquers, flash-coat drying, burn-off, core-baking, water dry-off or food processing.

"RADIANT-HEAT" as you know, means instantaneous heat transfer from source to product, the reason why savings of from 30% to 70% in time and 40% in fuel cost are reported by users of BURDETT GAS-FIRED OVENS. The BURDETT method does not rely upon AIR — in itself a poor heat conductor — for the transfer of heat. The INFRA-Red rays penetrate to the base material and heat from within, allowing free and progressive escape of all moisture and volatiles.



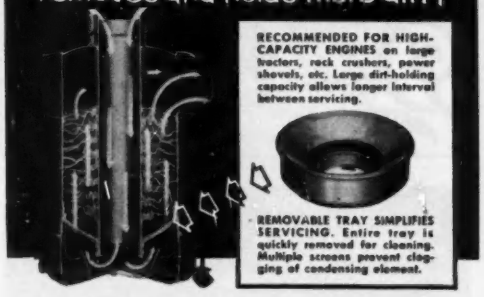
A wide range of sizes and capacities, flexibility in burner arrangements and conversion facilities will provide the best known solution to your heat processing problem. Request complete information. Send us your specifications and preliminary recommendations will be made by BURDETT engineers, without obligation.

BURDETT MANUFACTURING COMPANY

3427 West Madison Street Chicago 24, Illinois

OVENS AND "RADIANT HEAT" GAS BURNERS

New Tray-Type AIR CLEANER removes and holds more dirt!



RECOMMENDED FOR HIGH-CAPACITY ENGINES on large tractors, rock crushers, power shovels, etc. Large dirt-holding capacity allows longer interval between servicing.

REMOVABLE TRAY SIMPLIFIES SERVICING. Entire tray is quickly removed for cleaning. Multiple screens prevent clogging of condensing element.

IN THIS NEW Donaldson heavy-duty cleaner, the removable multi-screen "tray" and revised oil cup design feeds more of the condensed oil back into the air stream adjacent to the center tube.

A balanced distribution of oil across the entire lower element has been achieved, eliminating both overloaded and "thin" areas.

Extensive tests in the field over a period of five years prove conclusively that the new cleaner has a higher efficiency and a greater dirt-holding capacity. We invite manufacturers to write or call for design data and test reports.

DONALDSON CO., INC. 666 Pelham Blvd., St. Paul 4, Minnesota
Donaldson Co. Ltd. (Can.), Chatham, Ont.

Donaldson AIR CLEANERS

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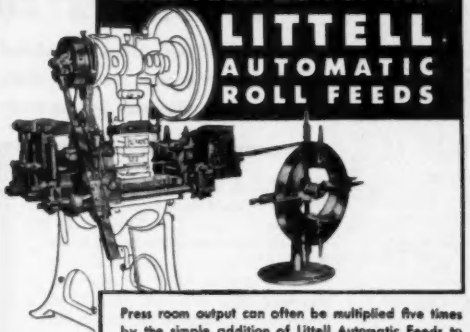

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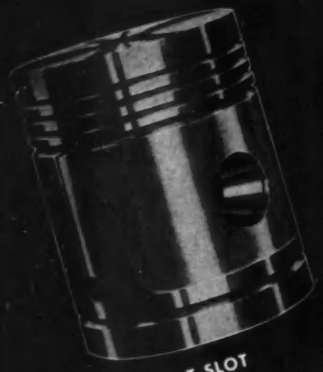

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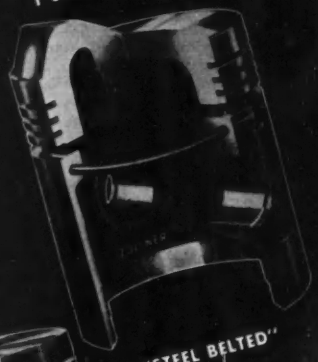

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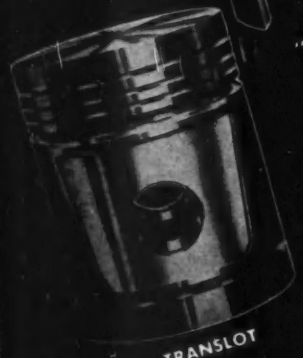

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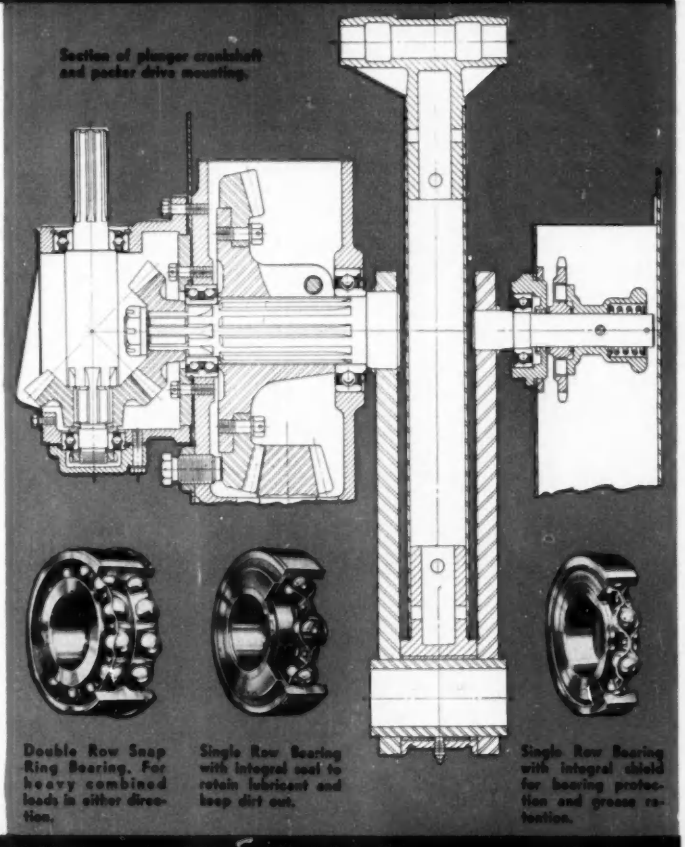
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